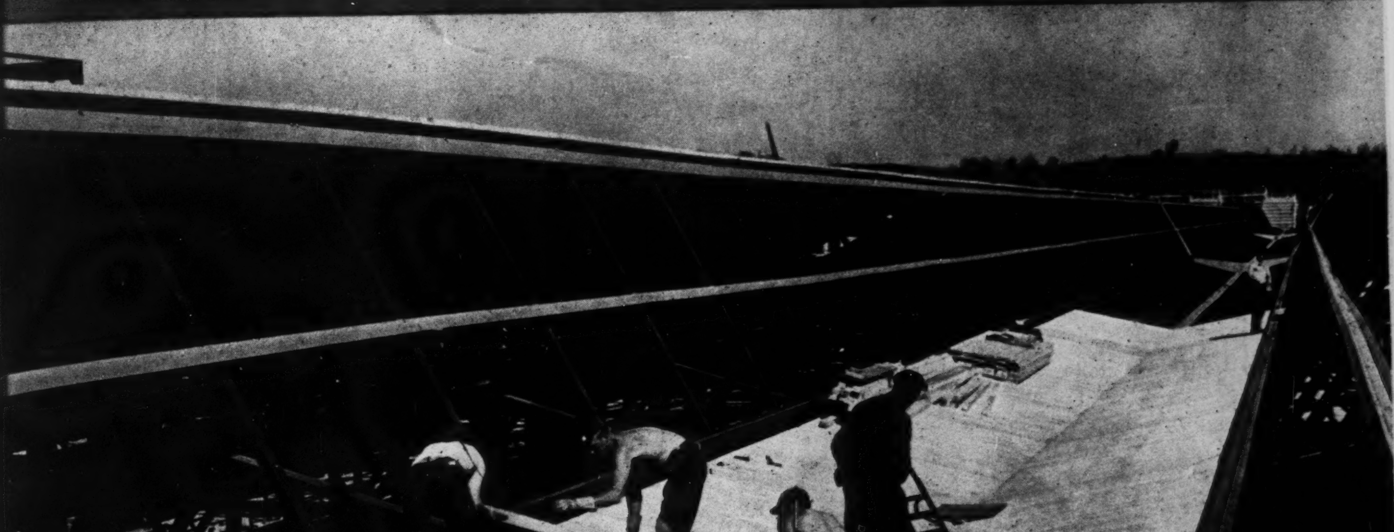
ENGINEERING NEWS-RECORD

JULY 3, 1941



Placing precast concrete units on 35-acre roof at Wright Aeronautical's Cincinnati plant

Running British Cities in War Time
Pumping Plant for Irrigation System
Marking Road Lanes with Stone Chips
Dynamic Test on Bridge Models

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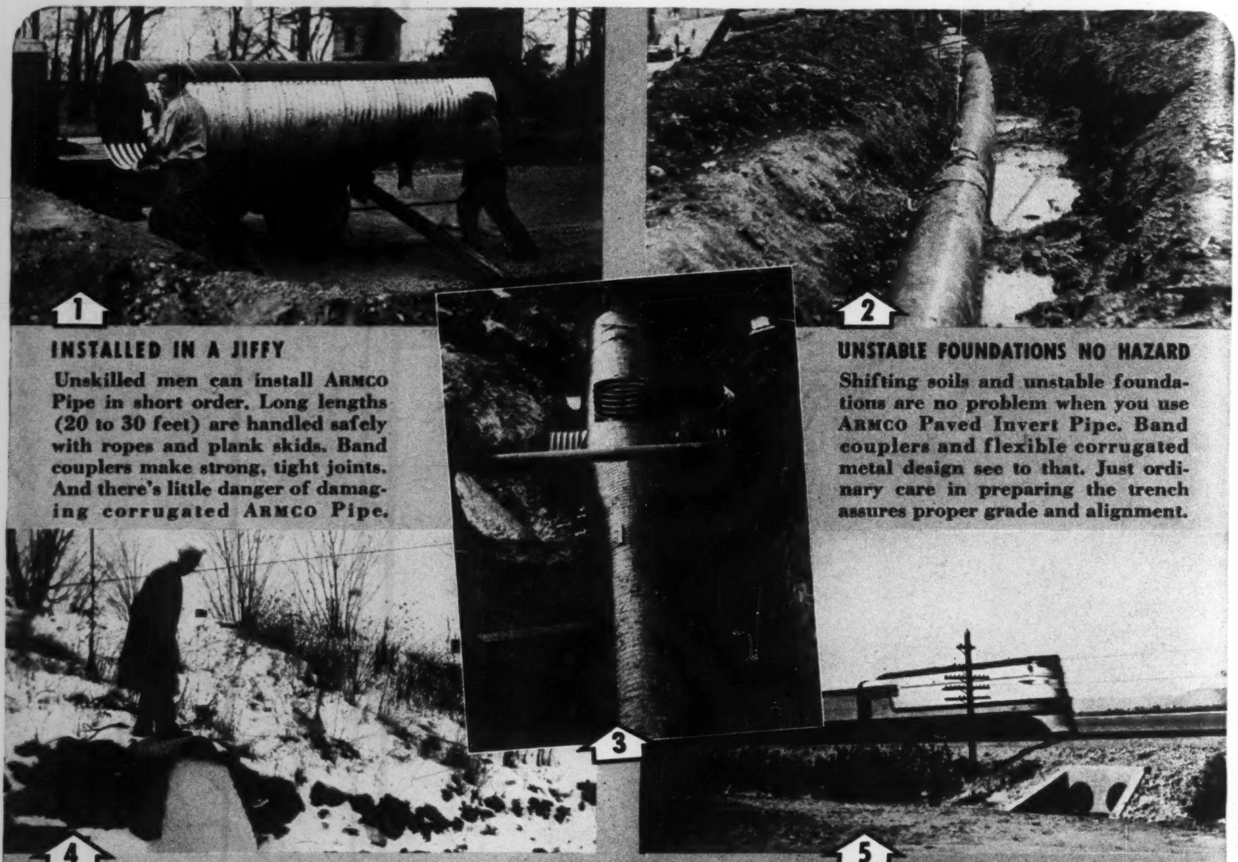
A Five Star Final on PIPE ECONOMY

Here's good news on drainage and sewerage jobs. You can stay ahead of schedule and under the estimate by using ARMCO Corrugated Paved Invert Pipe. Check these five advantages:



INSTALLED IN A JIFFY

Unskilled men can install ARMCO Pipe in short order. Long lengths (20 to 30 feet) are handled safely with ropes and plank skids. Band couplers make strong, tight joints. And there's little danger of damaging corrugated ARMCO Pipe.

UNSTABLE FOUNDATIONS NO HAZARD

Shifting soils and unstable foundations are no problem when you use ARMCO Paved Invert Pipe. Band couplers and flexible corrugated metal design see to that. Just ordinary care in preparing the trench assures proper grade and alignment.

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Ice and frost or other bad weather hold no terror for corrugated ARMCO Paved Invert Pipe. You can install it easily in any season without special protection or troublesome curing.

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ARMCO tailor-made fittings go in slick as a whistle. You're sure to save time and money with standard tees, wyes, elbows, reducers or other "specials" custom-built to fit the job.

STRENGTH TO SPARE

ARMCO Pipe takes the weight of high fills and traffic impact in stride. The flexible design provides ample strength to meet loading specifications with a wide margin of safety.

ENGINEERS SAY OKEY! ARMCO Pipe also brings this double assurance of trouble-free service: (1) A base metal of galvanized ARMCO Ingot Iron—proved in 35 years of service; (2) the added protection of a thick, special bituminous pavement in the bottom to guard against corrosion and erosion where the wear is hardest. Engineers appreciate this extra durability and accept ARMCO Paved Invert Pipe without question. Write us for prices and complete information. ARMCO DRAINAGE PRODUCTS ASSN., 5045 Curtis St., Middletown, Ohio.

ARMCO ARMCO **Paved Invert Pipe**

ENGINEERING NEWS-RECORD

Devoted to Buildings, Sewers, Waterworks, Bridges, Highways, Streets, Dams, Foundations, Earthwork, Flood Control, Public Works, Irrigation, Canals, Railroads
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Vol. 127 JULY 3, 1941 No. 1

THIS WEEK

• Despite 3½ months of intermittent rainstorms during construction of the Army's Camp San Luis Obispo, Calif., the heavy construction equipment, valued at more than $2,000,000, that had been collected for the job beat the mud situation in handling a 3,000,000-cu.yd. grading assignment. How this vast amount of equipment was used to best advantage is described in this issue.

• Time was the essence of the contract in constructing a Navy drydock at San Diego, Calif., where normally a cofferdam would have been built. Here the engineers put down wellpoints in three successive stages with risers 21 ft. long. The job was successfully accomplished in spite of considerable clay content entirely unfavorable to wellpoint operation, and excavation was carried on in the dry with slopes of 1:1¼. The procedure used is outlined in this number.

• The largest area of land in the world irrigated by pumped water is the Rio Grande Valley in southern Texas. One of the largest irrigation districts in the valley has recently put into service a new pumping plant. Using four 48-in. diesel-driven pumps at the Rio Grande, a main re-lift plant with three 42-in. diesel pumps, and smaller re-lift plants and portable units, water is carried 18 to 32 miles from the river at an elevation 25 to 75 ft., and distributed over 72,000 acres. How the system works is described in this issue.

THINGS TO COME

• Building a $28,000,000 air training station for the Navy, which involved nearly every phase of heavy and light construction, in 8 months to the time of commissioning and complete in 12 months is a story of organization at its best. Method of coordinating the work of 38 different departments on the job is of unusual interest.

• The first of a group of articles on flood-control work undertaken on the Connecticut River, which reviews major studies complete to date, will appear in July 17 issue.

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Number of copies of this issue printed: 35,308

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No order for reinforcing bars, wire mesh and other accessories is too small for Ryerson—you can depend on prompt personalized attention whether you order a few bars or a carload.

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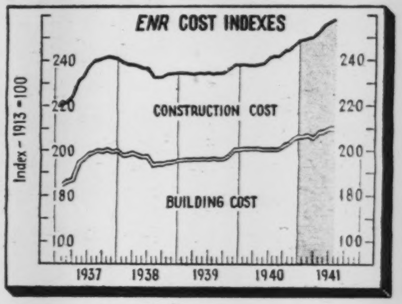
MONTHLY CONSTRUCTION BUSINESS SUMMARY

ENR CONSTRUCTION VOLUME AND NEW CAPITAL . . . . F H A MORTGAGES

(,000 omitted)	June 1940	June 1941	% Change	Six Months 1940	Six Months 1941	% Change
Total Construction	$252,763	$589,221	+133.0	$1,389,616	$2,841,403	+104.0
Private Construction	92,044	97,259	+6.0	484,244	734,418	+52.0
Public Construction	160,719	491,962	+206.0	905,372	2,106,985	+133.0
Federal	49,834	359,433	+622.0	215,431	1,427,953	+564.0
Total New Construction Capital	$51,132	$78,764	+54.0	$632,535	$3,350,544	+430.0
Private Investment	41,133	63,887	+55.0	538,382	392,434	−27.0
Federal (non-federal work)	9,999	14,877	+49.0	94,153	66,773	−29.0
Federal (federal work)	....	....	....	....	2,891,337	....
FHA Mortgages Selected for Appraisal	$109,380	$137,200*	+25.4	$636,143	$759,500*	+19.3

* *Preliminary.*



CONSTRUCTION COSTS . . . . WAGE RATES . . . . PRICES

	July 1940	July 1941	% Change	Change June to July 1940 June	1940 July	%	1941 June	1941 July	%
E N R Construction Cost Index, 1913 = 100	242.15	258.18	+6.6	241.59	242.15	+0.2	256.79	258.18	+0.5
E N R Building Cost Index, 1913 = 100	201.68	210.22	+4.2	201.65	201.68	‡	209.41	210.22	+0.4

ENR 20-CITIES' AVERAGE

	July 1940	July 1941	% Change	1940 June	1940 July	%	1941 June	1941 July	%
Common Labor	$0.707	$0.753	+6.5	$0.703	$0.707	+0.6	$0.747	$0.753	+0.8
Skilled Labor (Av. 3 trades)	1.476	1.501	+1.7	1.472	1.476	+0.3	1.492	1.501	+0.6
Bricklayers	1.568	1.595	+1.7	1.568	1.568	0	1.581	1.595	+0.9
Structural Ironworkers	1.535	1.582	+3.1	1.520	1.535	+1.0	1.569	1.582	+0.8
Carpenters	1.330	1.327	−0.2	1.328	1.330	+0.2	1.327	1.327	0
Cement, per bbl	$2.51	$2.52	+0.4	$2.51	$2.51	0	$2.52	$2.52	0
Reinforcing steel, per cwt.	2.43	2.60	+7.0	2.45	2.43	−0.8	2.58	2.60	+0.8
Struct. shapes, base	2.10	2.10	0	2.10	2.10	0	2.10	2.10	0
Sand, per ton	1.17	1.18	+0.9	1.18	1.17	−0.8	1.17	1.18	+0.9
Lumber, 2x4 Fir, per M ft.	34.88	41.22	+18.2	34.88	34.88	0	41.18	41.22	+0.1
Lumber, 2x4 Pine, per M ft.	31.15	37.37	+20.0	31.59	31.15	−1.4	37.07	37.37	+0.8
Brick, common, per M	14.34	14.81	+3.3	14.32	14.34	+0.1	14.68	14.81	+0.9
Ready-mixed concrete, c.y.	6.94	7.02	+1.2	6.98	6.94	−0.6	6.93	7.02	+1.3
Struct. clay tile, 3x12x12	74.49	74.21	−0.4	74.49	74.49	0	74.59	74.21	−0.5
Paving asphalt, cars, ton	14.16	14.49	+2.3	14.19	14.16	−0.2	14.43	14.49	+0.4

‡ *Less than .05 percent change.*

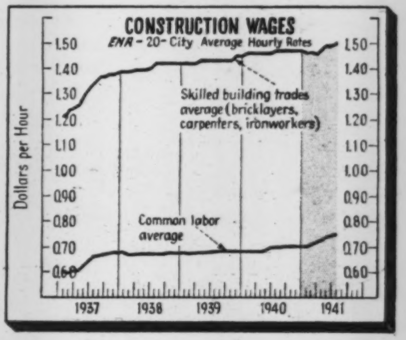
ENR INDEX NUMBERS

Base = 100	Construction Cost 1913	Construction Cost 1926	Building Cost '13	Building Cost '26	Volume '13	Volume '26
July, 1941	258.18	124.11	210.22	113.64	...	...
June, 1941	256.79	123.44	209.41	113.20	492	216
May, 1941	255.55	122.84	209.24	113.11	275	121
Apr., 1941	252.40	121.33	208.60	112.76	322	141
Mar., 1941	250.71	120.52	207.88	112.37	386	169
Feb., 1941	250.50	120.42	208.42	112.67	374	164
Jan., 1941	249.69	120.03	207.94	112.46	402	176
Dec., 1940	249.12	119.75	208.19	112.54	344	151
Nov., 1940	247.24	118.85	206.24	111.49	331	145
Oct., 1940	245.02	117.78	204.02	110.29	490	215
Sept., 1940	244.13	117.35	203.13	109.83	324	142
Aug., 1940	242.18	116.42	201.71	109.04	281	123
July, 1940	242.15	116.40	201.68	109.02	308	135
June, 1940	241.59	116.13	201.65	109.00	225	99
1940 (Av.)	241.96	116.31	202.81	109.64	269	118
1939 (Av.)	235.51	113.21	197.44	106.73	211	92
1938 (Av.)	235.86	113.34	196.83	106.40	197	86
1937 (Av.)	234.71	112.66	196.15	106.07	172	75

MATERIAL SHIPMENTS . . . . BUILDING PERMITS

	June 1940	June 1941	% Change	May 1941	% Change May-June
Lumber (% 1935–39 wk. seas. av.) N.L.M.A	119.1	129.0	+8.3	126.3	+2.1
Steel (% operating capacity) A.I.S.I	84.8	99.2	+17.0	98.6	+0.6

	May 1940	May 1941	% Change	Five Months 1940	Five Months 1941	% Change
Fabricated Structural Steel, tons, A.I.S.C.	115,617	172,730	+49.5	535,925	850,582	+58.7
Cement, thous. bbl., U. S. B. of M	13,206	16,048	+21.5	40,551	55,535	+37.0
Building Permits, Dun and Bradstreet (,000 omitted)	$126,341	$143,023	+13.2	$534,678	$621,808	+16.3



INDEX . . . . EMPLOYMENT

	May 1940	May 1941	% Change	Apr. 1941	% Change Apr.-May
Rent (Housing) Index, N.I.C.B	86.7	88.0	+1.5	87.8	+0.2
Est. Total Employment, thous., N.I.C.B	46,266	51,647	+11.7	50,205	+2.9
Est. Construction Employment, thous., N.I.C.B	1,969	2,819	+43.2	2,580	+9.2

ENGINEERING CONSTRUCTION CONTRACTS——ENGINEERNG NEWS-RECORD——JUNE, 1941

Engineering News-Record *reports projects of the following minimum costs;—water-works, excavation, drainage and irrigation,* $15,000; *other public works,* $25,000; *industrial buildings,* $40,000; *other buildings,* $150,000

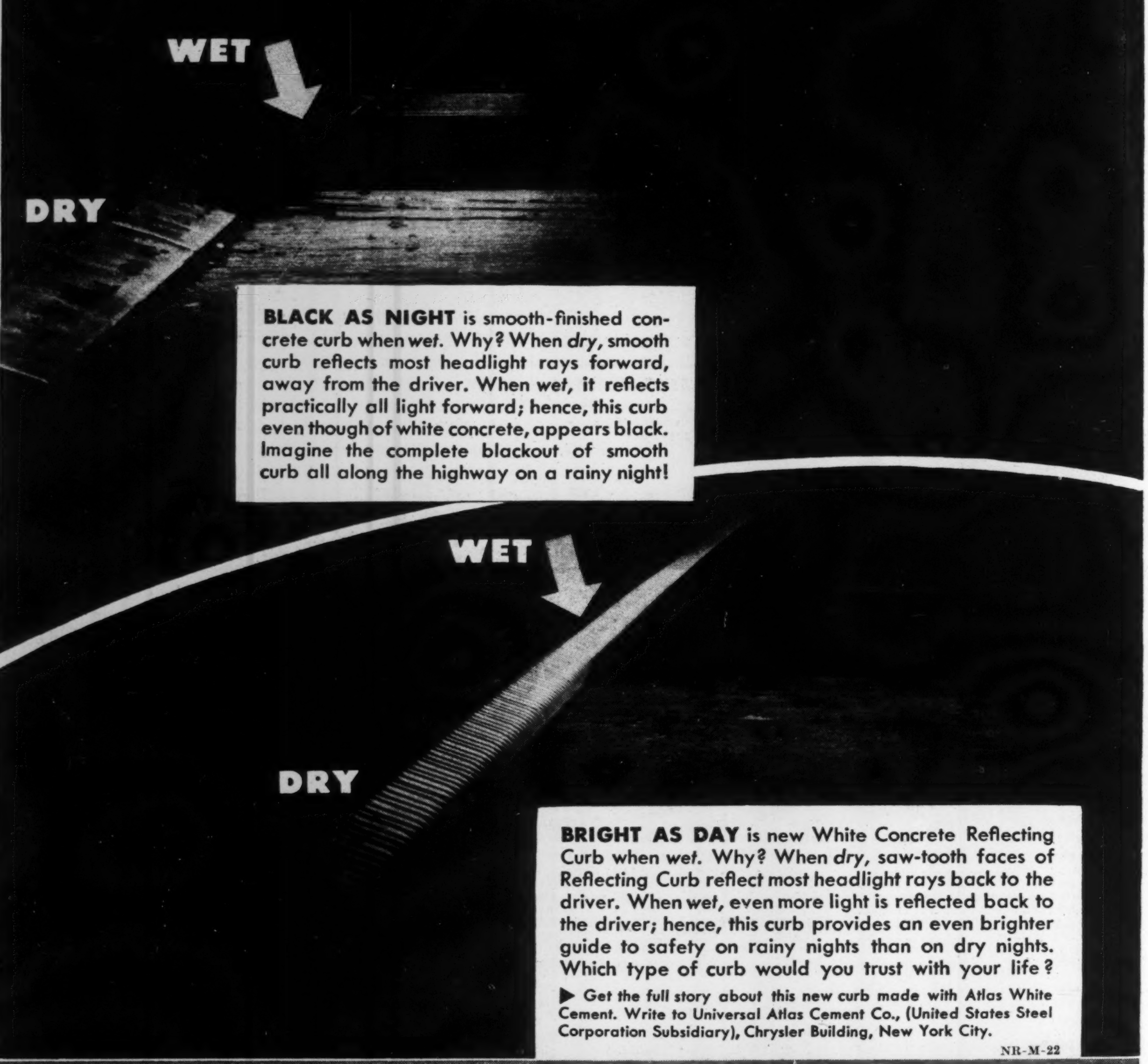
Four Weeks—Thousands of Dollars (000 Omitted)

Public Works	**New England**	**Middle Atlantic**	**South**	**Middle West**	**West of Mississippi**	**Far West**	**United States June 1941**	**United States Six Months 1941**	**United States Six Months 1940**	**Canada**
Waterworks	262	533	383	1,868	1,284	457	**4,787**	38,171	39,236	180
Sewerage	287	3,069	350	1,045	1,114	1,003	**6,868**	52,473	44,951	294
Bridges, public	1,397	3,838	1,708	3,004	2,678	473	**13,098**	61,049	50,681	179
Earthwork and waterways	857	5,513	16,868	689	5,555	453	**29,935**	101,102	124,821	42
Streets and roads	2,983	9,967	9,725	6,968	17,403	7,061	**54,107**	302,799	364,041	2,518
Buildings, public	9,808	27,520	102,119	64,600	85,154	18,998	**308,199**	1,163,928	176,267	13,645
Unclassified, public	9,083	19,820	25,266	1,085	7,169	12,545	**74,968**	387,463	105,375	7,373
Total public	**24,677**	**70,260**	**156,419**	**79,259**	**120,357**	**40,990**	**491,962**	**2,106,985**	**905,372**	**24,231**
Federal government (included in above classifications)	14,677	33,288	140,386	54,550	91,275	25,257	**359,433**	**1,427,953**	**215,431**	....
Private										
Bridges, private	25	....	....	59	....	....	**84**	5,275	8,471	....
Buildings, industrial	1,345	11,741	2,187	8,491	3,296	2,861	**29,921**	303,957	222,453	4,347
Buildings, commercial	3,045	17,909	1,005	1,710	5,229	11,466	**40,364**	298,502	196,405	675
Unclassified, private	3,504	1,241	16,137	983	3,506	1,519	**26,890**	126,684	56,915	3,760
Total private	**7,919**	**30,891**	**19,329**	**11,243**	**12,031**	**15,846**	**97,259**	**734,418**	**484,244**	**8,782**
Total Engineering Construction:										
June, 1941 (4 weeks)	**32,596**	**101,151**	**175,748**	**90,502**	**132,388**	**56,836**	**589,221**	....	....	**33,013**
May, 1941 (5 weeks)	23,359	89,199	103,237	66,773	73,466	53,337	**409,371**	....	....	18,593
June, 1940 (4 weeks)	18,296	62,923	40,765	40,741	60,252	29,786	**252,763**	....	....	19,460
Six Months — 1941	**164,385**	**647,070**	**611,823**	**536,773**	**519,705**	**361,647**	....	**2,841,403**	....	**113,093**
Six Months — 1940	69,787	353,857	275,818	250,818	278,707	160,629	....	....	1,389,616	74,842

A PUDDLE OF WATER TELLS THE STORY...

of greater driving visibility with White Concrete Reflecting Curb!

(The wet spot appears black)



BLACK AS NIGHT is smooth-finished concrete curb when *wet*. Why? When *dry*, smooth curb reflects most headlight rays forward, away from the driver. When *wet*, it reflects practically all light forward; hence, this curb even though of white concrete, appears black. Imagine the complete blackout of smooth curb all along the highway on a rainy night!

BRIGHT AS DAY is new White Concrete Reflecting Curb when *wet*. Why? When *dry*, saw-tooth faces of Reflecting Curb reflect most headlight rays back to the driver. When *wet*, even more light is reflected back to the driver; hence, this curb provides an even brighter guide to safety on rainy nights than on dry nights. Which type of curb would you trust with your life?

▶ **Get the full story about this new curb made with Atlas White Cement. Write to Universal Atlas Cement Co., (United States Steel Corporation Subsidiary), Chrysler Building, New York City.**

NR-M-22

WHITE CONCRETE REFLECTING CURB

MADE WITH ATLAS WHITE CEMENT

The Week In Engineering and Construction

ENGINEERING NEWS-RECORD • JULY 3, 1941

Program to stabilize labor wage rates on construction

Agreement in principle for the program has been arrived at by top labor and government officials. Wage rates would be determined in advance before contracts are let

A program to stabilize construction labor wage rates and conditions of employment is now being worked out by the Labor Division of OPM, the AFL Building Trades Union, and the various agencies which do construction work.

The basic conception of the scheme is similar to that of the shipyards stabilization agreement, based on four homogeneous regions within which standard wage rates and conditions have been worked out. For construction, however, no such definite regions are available.

Rather it is intended to go into an area where a considerable number of defense construction projects are known to be pending, and establish wages which will govern a job, perhaps for a year, perhaps until its completion. The rate would be determined in conference among government, labor and employer representatives.

These wage rates would be determined before a construction contract is completed with any particular contractor. The union would promise to sign an agreement incorporating standard wages with whatever contractor got the job. This would assure against having wage rates for a large number of jobs upset because some one government agency or contractor in the area grants higher wages.

Obviously some arrangement would have to be worked out with the Labor Department to assure that the standard wage rates would be accepted by the department as prevailing rates under the Bacon-Davis Act.

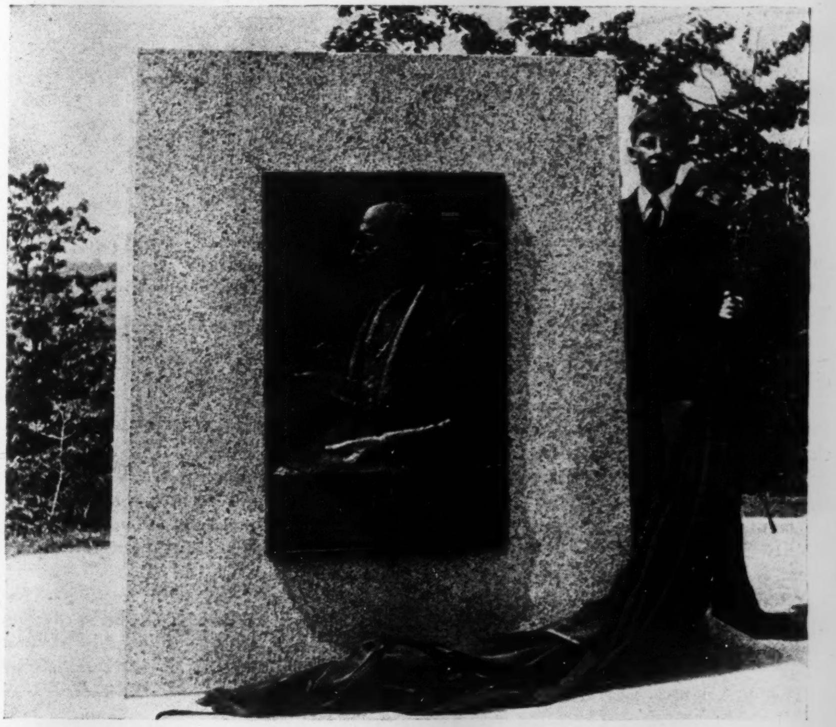
Geographically, broader standardization will be possible as regards standardization of shift and overtime arrangements. OPM is seeking a single national standard on these points. Probably this would be based on time and a half for overtime and 8 hours pay for 7½ hours work on extra shift; extra shift permitted wherever desirable.

Agreement in principle for the standardization program has now been arrived at by top labor and government officials. Details still await approval.

Advantages of the standardization program to the contractor—who would know in advance what his labor conditions on a given job will be—are obvious. To the unions it means universal acceptance of unionization on defense jobs. Moreover it appears that it would freeze the CIO construction organizing committee out of defense work.

Sidney Hillman has indicated that the government is prepared to put teeth into the plan once it is completed; work would perhaps be withheld from contractors not conforming.

But these broader perspectives are for the future. For the present the plan is limited to wage and hour considerations.



Frank E. Winsor memorial tablet unveiled

A memorial tablet in honor of the late Frank E. Winsor, chief engineer of the Boston metropolitan water supply Commission from 1926 to 1939, was dedicated on June 17 at the Quabbin Reservoir and Winsor Dam, near Ware, Mass., in the presence of 250 officials and guests, including lifelong friends of Mr. Winsor. The monument was unveiled by Edward Winsor, grandson of the late engineer. Arthur D. Weston, chairman of the joint committee of the Boston Engineering Society and Northeastern section, American Society of Civil Engineers, sponsored the memorial; Gov. Leverett Saltonstall, accepted the memorial for the state; Secretary George T. Seabury, Am. Soc. C. E., presented the memorial, and Chairman Eugene C. Hultman of the commission, accepted the custodianship of the tablet.

New form adopted for fixed-fee contracts

It becomes considerably harder for a contractor to obtain an increase in his fee on fixed-fee construction when the scope of the work is changed, under the terms of a new form of contract adopted last month by the War Department. The form of contract previously used permitted a change in the fee when the scope of the work changed "substantially."

The new contract includes in the definition of the work to be done a numerical measure of the "accommodations" provided by the contract—number of men in a cantonment, storage area in a warehouse, and the like. It is specified that no change shall be made in the contractors fee as a result of changes in the work unless the effect of the change is to increase the accommodations by more than 25 percent. Thus it would appear that addition of, say, recreational facilities to a cantonment project would not lead to any change in the fee.

In general, the new contract form, known as FF Form 1, closely follows the form previously used (*ENR*, Aug. 15, 1940 p. 229).

A slight concession is made in the new form to objections of contractors to the equipment recapture clause under which the department takes over equipment used in the work when rental payments equal the value of the equipment plus depreciation or upon payment of the the difference between the value and the total of rentals paid. This concession is that in cases where the contractor is renting the equipment from a third party, the recapture clause may be waived by the chief of the supply arm, or service.

This change will not do much to meet objections of contractors. The Corps of Engineers last month went a good deal farther when it introduced a provision that when rental payments reach 50 percent of the value of the equipment, the contractor may waive further rental payments; this leaves the recapture possibility but will tend to make it less common by requiring the department to pay out half the value of the equipment in a lump if it is desired to recapture. Navy contracts contain no recapture clause.

The new contract form introduces the principle of retaining payments into fee contracts for the first time. The fee is to be paid as it accrues except for ten percent, which will be retained until acceptance of the work.

Other changes, require listing of subcontractors to be used; raise the travel allowance to $6; specify accounting and auditing procedures; require notification of the Construction Division of any pending labor dispute; and make minor changes in language.

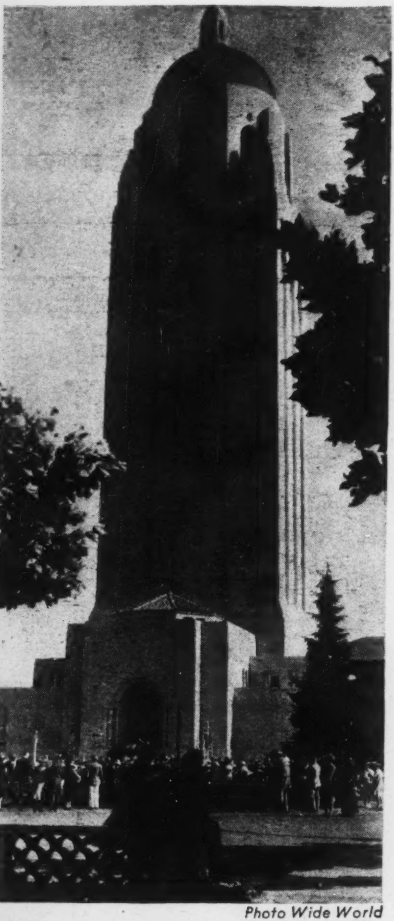


Photo Wide World

War memorial dedicated at Stanford University

Former President Herbert Hoover dedicated the new $550,000 Hoover Library on War, Revolution and Peace, a stately shaft towering 279 ft. above the Stanford University campus, at Palo Alto, Calif., on June 21. The building will house more than 5,000,000 documents, rare books and secret reports of the World War.

The structure is located only 2 miles from the active San Andreas fault and, as its function is to provide a permanent repository for valuable records, precautions were taken to safeguard the structure against earthquake damage.

Though carried by steel framework, the tower is inclosed with reinforced-concrete walls designed to resist earthquake stresses, while the steel frame is braced to resist wind loads only. To carry the horizontal forces from the tower to the outer walls of the two-story structure at the base and thereby distribute them over the 122-ft. square of the base, the roof of the base structure was made 6 in. thick instead of the 4 in. that would have served other purposes.

Hall & Pregnoff, structural engineers, designed the structure. Arthur Brown, Jr. and John Bakewell, Jr. were the architects and George Wagner held the $550,000 contract for construction of the memorial. All are San Francisco firms.

Priority aid for defense housing construction

Plans to give priority aid to construction of defense housing and correspondingly to put non-defense housing under a severe handicap were officially announced this week by Housing Coordinator Palmer. Precise details are not yet worked out but in a general way the procedure will be much as follows: A defense housing critical list will be prepared listing house materials which are scarce. With a few exceptions materials of a strategic nature — aluminum, copper, nickel, bronze, and the like, will not be included on the list.

Ratings giving preference in purchasing items on the housing critical list will be assigned to publicly financed defense housing projects upon certification by the housing coordinator. What rating is given will depend upon the defense importance of the industry being served by the project.

For privately financed housing, so-called area ratings will be established. These will give preference to housing built in areas designated by the coordinator as defense areas. About 175 such areas have already been defined. These area ratings will be extended to specific house builders, provided they are not building houses to sell at more than $6,000 nor to rent at more than $50 a month and that reasonable preference in occupancy will be given to workers engaged in defense industries. Extension of the ratings will be handled by local representatives of the housing coordinator. These have not yet been appointed, but will probably be named within a month. The same considerations apply to rehabilitation of houses. The critical list will not be ready for a week or so. It is believed, however, that builders of non-defense housing will find it difficult or impossible to obtain plumbing, heating and ventilating equipment, insulating board, most metals and in some localities lumber. An incidental effect will be to make it more than ever important that builders of non-residential defense structures obtain any priority ratings to which they are entitled.

• • •

Michigan to condemn land for limited access roads

A bill authorizing condemnation of land for limited access highways, the first step toward construction of the proposed express crosstown highways in Detroit, was signed last week by Governor Murray D. Van Wagoner of Michigan.

Another bill signed by the governor will permit county road commissions to participate in group insurance, pension and annuity programs for their employees.

A.S.T.M. specification actively turned toward defense requirements

Annual meeting in Chicago emphasizes need for emergency revision of specifications for materials required for defense work

Already activity participating in the defense program through its officers and members, the American Society for Testing Materials at its 44th annual meeting in Chicago last week made further plans and pledges of cooperation. Citing the fact that new materials as well as test requirements are being constantly introduced, also that rapid changes in availability of strategic materials place a premium on substitutes, the executive committee urged vigorous specification work, especially with respect to emergency changes and prompt publication of revised standards.

To further this aim a procedure was announced whereby temporary revisions of A.S.T.M. standards can be put into effect in minimum time. Already, the federal government is using what it terms "emergency alternate" specifications, which embody provisions for conserving scarce materials, and the new A.S.T.M. plan has a similar objective. Proposed emergency revisions of A.S.T.M. specifications will need only the approval of the appropriate subcommittee and of the chairman of the sponsoring committee before being submitted to the society's committee E-10 on standards for approval and publication "in the form of a sticker or accompanying sheet" to the existing specification. Nine-tenths or more of the time normally required for revisions can be saved by this procedure.

The secretary-treasurer, C. L. Warwick, is acting as consultant to OPM on specifications for strategic materials, and other members are serving on committees charged with procurement problems, so that the needs of the government and of industry are quickly made known to the society. The executive committee report brought out that in 1917 there were only 133 A.S.T.M. specifications, methods and definitions, while today there are 952; also that the system of federal specifications has been established during the past 20 years, so that the nation is much better prepared with specifications upon which to base materials procurement than it was in the last war.

Features of the meeting

The meeting presented the usual scene of intense work and interest, with some 115 separate technical papers and committee reports on the program. Divided into 17 sessions that grouped the papers according to specific materials or fields of interest, the program produced many developments of importance to construction. Thus the specification for portland cement, covering five distinct types of product instead of the single one that was current for many years prior to last, was advanced to official standard status. And in the field of steel a specification covering low-alloy structural steel, manufactured under a large variety of proprietary names and chemical compositions since 1935, was made available for the first time; low in carbon content, it is weldable, while its alloy content gives it a high yield point. Further details of this specification work are recorded at the end of this account, and abstracts of the important research papers presented at the meeting will be published in the July 17 issue.

The retiring president, W. M. Barr, chief chemical and metallurgical engineer, Union Pacific R.R., took as the subject of his address "Speed Specifications and Safety," in which he reviewed the progress made in rolling stock by using lighter and higher strength materials and in improving rails by utilizing "controlled cooling" after the hot rolling. This address as well as one on "Mobilizing Materials for Defense" by J. H. Van Deventer, editor *The Iron Age*, were the highlights of the opening session. Mr. Van Deventer emphasized the dominant position of materials in our defense effort and analyzed the conditions of supply and availability of the most critical ones. Aluminum and magnesium, despite vast expansion, top the list of materials short of demand; copper, zinc and nickel are also on this list. Tungsten is on the borderline of being short. There is no

Signalizing completion of a $200,000,000 job

Removal of the last rails of the old New York Central tracks from the street surface on 11th Ave., New York, on June 25, was made the occasion for celebrating completion of sixteen years of work and nearly a half-century of planning to get railroad tracks off the streets of the West Side of Manhattan Island. Here shown, standing to the left of the rail is Richard E. Dougherty, vice president of the New York Central, the engineering executive under whose general direction the work was carried out. Beside Mr. Dougherty is Harold W. McGraw, president, West Side Association of Commerce, and to the right of the rail are Newbold Morris, acting mayor, Wm. G. Fuller, chairman of the Transit Commission, and Borough President Stanley M. Isaacs.

The West Side Improvement covers 13 miles of trackage and several large and small yards along the west side of Manhattan. In all, grade crossings have been eliminated at 105 streets, and the longitudinal tracks that ran for miles along 10th and 11th avenues have been entirely eliminated. Most of the latte tracks have been off the avenues for several years, now being elevated or depressed along a private right-of-way, but the difficul job of reconstructing the 30th St. yards held up completion of the entire project.

Originally estimated to cost $139,000,000 of which the railroad was to pay $121,000,000 and the city and state the remainder, changes made as the work progressed have brought the total cost to around $200,000,000.

present shortage in tin, lead, antimony, cobalt, manganese or chromium. Increases in prices could bring in new supplies of many of these materials from high cost producing areas. Better shipping facilities would also help on the imported materials such as copper and manganese. Mr. Van Deventer urged better coordination of government specifying so that critical materials will not be used in non-essential applications.

The annual Marburg Lecture was delivered by H. L. Fisher, director of organic research, U. S. Industrial Chemicals, Inc., an authority on "Natural and Synthetic Rubbers," the subject of his address. At this same session the Dudley Medal was awarded to Prof. C. W. MacGregor, Massachusetts Institute of Technology, for his paper at last year's convention on "The Tension Test." Later, the Sanford E. Thompson Award of Committee C-9 was given to W. T. Thompson, assistant professor of mechanics, Kansas State College, for his paper "A Method of Measuring Thermal Diffusivity and Conductivity of Stone and Concrete".

A feature of the meeting was a joint session with the Western Society of Engineers devoted to two papers on Chicago's subway and superhighway work —a general paper by Charles DeLeuw, acting chief engineer, and one on "Measurement of Earth Pressures," by Ralph B. Peck, assistant subway engineer.

The biennial exhibit of testing apparatus and instruments, held in connection with the convention, gave the members opportunity to examine the new designs developed during the past two years by some thirty manufacturers.

New Officers

Officers elected for the coming year were: President, G. E. F. Lundell, chief, chemistry division, National Bureau of Standards, and vice president, Dean Harvey, materials engineer, Westinghouse Electric & Mfg. Co. Five new members were also added to the executive committee: Arthur W. Carpenter, the B. F. Goodrich Co.; T. A. Fitch, director, Los Angeles Bureau of Standards; Carl D. Hocker, Bell Telephone Laboratories; J. L. Miner, Atlas Lumnite Cement Co.; and E. W. Upham, Chrysler Corp.

Specification activities

Steel (Comm. A-1). Although this committee presented seven new specifications and revisions of nearly 30 others, only a few are applicable to construction. One however is particularly important and, as previously noted, covers low-alloy structural steels; it is counted upon to relieve a confusing situation in this rapidly-developed field and to offer a high yield point steel that is weldable, an advantage not available with the present commonly used structural silicon steel. Carbon is limited to 0.20 per cent, manganese to 1.25 and sulphur to 0.05, while minimum yield points are set at 50,000 lb. per sq. in. for material up to $\frac{3}{4}$ in. thick; 45,000 for material $\frac{3}{4}$ to $1\frac{1}{2}$ in., and 43,000 for material $1\frac{1}{2}$ to 2 in. thick. Another new specification covers structural grade sheets in thickness of $\frac{1}{4}$ in. and less, a product that is finding increasing use, after cold forming, in building walls, roofs and floors. Finally in the standard specification for steel for bridges and buildings references to eyebars were removed since eyebars larger than 6 in. are no longer manufactured.

Corrosion of Iron and Steel (Comm. A-5) Inspection of metallic coated steel wire exposed in eleven locations throughout the country for four years justifies the following conclusions according to the subcommittee in charge: (1) Amount of protection increases with weight of zinc coating; (2) rate of loss of zinc coating is greater on small diameter wires than on large; (3) rate of loss of base metal is more rapid on small wires than on large. It was also pointed out that copper covered wires show no rusting after four years while lead coated wires show some pin hole rusting.

Cement (Comm. C-1). Recognition as standard of specification C 150 covering five types of portland cement and replacing standard portland cement specifications C9-38 and high-early-strength cement specification C74-39 represented a milestone in this field. A revision (largely in the nature of clarifying wording) of the tentative method of test for fineness of portland cement by means of the turbidimeter was also adopted. Subcommittee activities relate to a number of important questions. The possibility of placing limits on the permissible amounts of the oxides of sodium and potassium, to reduce deleterious alkali reactions with certain aggregates resulting in surface cracking, is receiving careful consideration. Autoclaving as a test of soundness continues to be studied in comparison with expansion of neat cement bars, with freezing and thawing tests and with the Merriman sugar test. Studies are planned to attempt to develop a physical test for sulphate resistance that will evaluate the usefulness of a cement in that service. Methods of molding mortar compression specimens by vibration instead of manual manipulation are being investigated. Finally the tests of permissible additions to cement have resulted in approval of TDA as non-harmful, and work is continuing on other proposed additions.

Fire Tests. (Comm. C-5). A new tentative method of test for fire-retardant properties of wood was introduced. It was based on a four-year study by five laboratories of all current methods applicable to wood chemically treated by impregnation. Prof. W. J. Krefeld (Columbia University) presented the extensive report of these studies. Briefly the test requires wood samples reduced to 7 percent moisture content to be stacked in the form of a crib in a wire frame and placed directly over a burner flame; burned until glowing ceases, the remnants are weighed and the percent loss in weight determined.

Lime (Comm. C-7). In view of recent changes made in the lime industry in processing hydrating limes, revision of the specification for hydrated lime for structural purposes is under study but awaits more service and laboratory data on these specially processed hydrates.

Concrete. (Comm. C-9). Although the standard specifications for ready mixed concrete are to remain in force, a new tentative standard was submitted that recognizes developments in this field that have taken place since the standard was adopted in 1938. One interesting change is the designation of 3 types of ready mixed concrete: (a) central mixed; (b) transit mixed; and (c) shrink mixed, in which part of the mixing is done at a central plant and part in transit. A change made in Specification C88-39T (sodium sulphate test for soundness of aggregates) makes time of submersion of specimens "not less than 16 hr." instead of 18 hr. The change permits the test to be completed in one 24-hr. cycle instead of the two often required.

Gypsum. (Comm. C-11). The specification for gypsum partition tile and block was revised to accord with the new federal specification in all particulars. Also in the specification covering definitions of terms relating to gypsum the following revised definitions were included:

> Gypsum Lath—A sheet or slab having an incombustible core of gypsum, containing not more than 15 per cent by weight of fiber, and surfaced with paper suitable to receive gypsum plaster.
>
> Gypsum Sheeting Board—A sheet or slab having an incombustible core of gypsum, containing not more than 15 per cent by weight of fiber, and surfaced with a water-resistive paper.
>
> Gypsum Wall Board—A sheet or slab having an incombustible core of gypsum, containing not more than 15 per cent by weight of fiber, and surfaced with paper suitable to receive decoration.

Mortars. (Comm. C-12). Although subcommittees on mortars for concrete masonry units and for glass block are working on specifications, the only new specification offered covers reinforced brick masonry.

Concrete Pipe (Comm. C-13). Three specifications covering respectively concrete sewer pipe, reinforced concrete sewer pipe, and reinforced concrete culvert pipe were changed from tentative to standard status after slight revisions and these replace the older existing standard specifications. Revisions consisted of making the cement conform to Types I or III of the new portland cement specification, of detailing the types of tests that a pur-

(Continued on page 42)

A.W.W.A. at Toronto meeting tackles emergency problems

American Water Works Association at its 61st convention learns that chlorine is given defense priority rating. Membership at new high record of 4,140.

A.W.W.A's new president

Louis R. Howson, member of the firm of Alvord, Burdick & Howson, consulting engineers of Chicago, last week was elected president of the American Water Works Association at that organization's 61st annual meeting at Toronto, Ont.

With a seriousness of purpose even more pronounced than usual, the American Water Works Association met in Toronto, Canada, June 22–26, for its 61st convention, and there paid special attention to national defense aspects of water supply along with emergency service measures. These matters stood out in sharp relief against the backdrop of Canada's war efforts, and they were given added emphasis in a challenging address by Willard Chevalier, vice-president of the McGraw-Hill Publishing Co. and publisher of *Business Week*, who heaped scorn on those Americans who have adopted the attitude that we have "a nice, comfortable, one-shift defense program", and that everything will come out all right in the end.

Chlorine supply assured

One big worry was lifted from the shoulders of water purveyors when a communication was received at the close of the convention from Edward R. Stettinius, Jr., director of the Priorities Division, Office of Production Management, stating that chlorine for sterilization purposes had been given a defense material priority rating. Heretofore, chlorine for water supplies had been in the civilian priorities group and much concern was felt regarding the adequacy of this chemical for safeguarding water quality.

Highlighted on the technical program, abstracts from which will be published in the July 17 issue, was the first draft of suggested modifications to the U. S. Treasury standards of water quality. Major recommendations outlined by J. K. Hoskins, chief of the sanitation section, U. S. Public Health Service, dealt with a change in the size of water samples for examination (from 10 milliliters to 100 ml.); examination of samples from points in the distribution system in addition to those now taken at the treatment plant; daily sampling of supplies when results indicate significant pollution; and higher permissible limits for copper and zinc.

Paid registration at the convention totaled 1,445, just 22 short of the record-breaking tally at Kansas City last year. Defense activities—affecting particularly manufacturers' representatives — were said to have prevented many members from taking time off for the meeting. Defense work, likewise, was said to be a factor controlling the number of exhibits; these totaled 77, as compared with about 98 at the 1940 meeting in Kansas City.

Many of the exhibitors were in the anomalous position of showing equipment on which they could take no orders for immediate delivery because defense demands held priority. However, as one exhibitor put it, "We may be oversold on equipment, but we still have a large stock of goodwill and service to dispense."

Howson is new president

Succeeding Norman J. Howard, director of water purification at Toronto, as president, was Louis R. Howson, consulting engineer of Chicago. One of President Howson's first acts of office was to announce that he would appoint a committee on priorities to assist in the procurement of essential waterworks materials.

Vice-president of the A.W.W.A. is Abel Wolman, professor of sanitary engineering at the Johns Hopkins University, Baltimore. Continuing in office as treasurer is William W. Brush, editor of *Waterworks Engineering*.

At the annual meeting of the Water and Sewage Works Manufacturers' Association, Denis F. O'Brien, of the A. P. Smith Manufacturing Co., was elected president to succeed Karl M. Mann, president of the Case-Shepperd-Mann Publishing Co. Other association officers-elect (terms of office begin in November) were: Dan McAfee, The Dorr Co., vice-president; John A. Kienle, Mathieson Alkali Works, Inc., secretary; and Edgar J. Buttenheim, *The American City*, treasurer.

Honored with awards

Highest award of the A.W.W.A.—the John M. Diven Medal "for outstanding service"—went to W. W. Hurlbut, assistant chief engineer and general manager of the Los Angeles Bureau of Water Supply. Mr. Hurlbut, president of the

Standard-Dominion News Photo

Canadians who made A.W.W.A's meeting a success

Outstanding among the Canadian engineers responsible for the successful annual convention of the American Water Works Association at Toronto, Ont. June 22-26 were the group shown above. They are, left to right: Norman J. Howard, director of water purification at Toronto and retiring president of the association; J. H. Strickland, superintendent of filtration at Windsor, Ont., and a past chairman of the A.W.W.A's Canadian section; J. Clark Keith, general manager, Windsor, Ont. Public Utilities Commission and Canadian section representative on the association's board of directors; William Storrie, Toronto consulting engineer and new chairman of the Canadian section; and A. E. Berry, chief sanitary engineer of the Ontario department of health and reelected Canadian section secretary-treasurer.

association in 1937, received the award for his leadership of the steel pipe committee.

Paul Weir, superintendent of filtration, Atlanta, Ga., was the recipient of the John M. Goodell prize, established under the terms of an endowment by *Engineering News-Record* as a memorial to a former editor of this paper. Mr. Weir received the award for his paper on the effect of internal pipe linings on water quality.

Highest membership on record—4,140—was reported at the close of the convention by Harry Jordan, secretary of the A.W.W.A. Last year the membership total was 3,710. Other figures compiled by Mr. Jordan showed that the California section was the largest local group with 536 members, and that the New York section was runner-up with 452 members.

The Pacific Northwest section took first honors (and two cups!) in two divisions: (1) for having the largest percentage gain in membership; and (2) for holding the best-attended meeting during the year past.

Next year, it was revealed, the A.W.W.A. will hold its annual meeting in Chicago. The date has not been set.

For the 27th consecutive year *Engineering News-Record* published three issues of the Waterworks Daily, a 12-page newspaper appearing at the beginning of each morning's session and devoted to news of personalities and convention activities.

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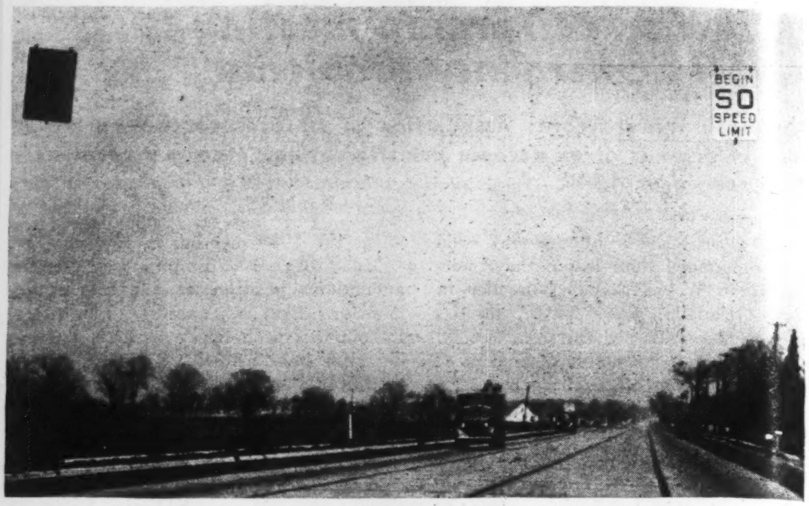

Indiana tries overhead highway signs

In an effort to reduce accidents on the 4-mile section of 6-lane highway on U. S. Route 36 east of South Bend, the Indiana State Highway Commission has installed overhead speed restriction signs. Studies by the commission revealed the usual warning signs at the shoulders were often masked from view of drivers on the inside lanes by cars on the outer lanes. An average of 5 serious accidents per month occurred on this section last year and this spring, while only one accident has happened in the month since the signs were moved to overhead position. State highway police and the sheriff's office are patrolling the section. Chairman J. D. Adams of the commission announces that overhead signs are being considered for other hazardous multiple-lane roads in the state.

A.S.T.M. specifications for defense requirements

(*Continued from page 40*)

chaser may demand, and of fixing more definitely the covering of reinforcement in the barrel of the pipe and the amount of reinforcement at the joints.

Masonry Units. (Comm. C-15). A new specification was introduced covering clay filter block for trickling filters.

Insulating Materials. (Comm. C-16). Formed in 1938, this committee made its first formal report which contained a half-dozen tentative standard tests relating to block type insulation, thermal insulating cement and blanket type insulation. The subcommittee on physical properties of the blanket and loose-fill types is studying effects of prolonged heating and moisture on these products and also their effects on corrosion of metals.

Paint. (Comm. D-1). Submitted two new methods of test relating to painting iron and steel—method of cleaning test panels before painting and a method involving photographic reference standards for evaluating degree of rusting on painted test panels.

Road Materials. (Comm. D-4). The most significant action coming out of this committee was a revision of the test method that uses the Los Angeles rattler machines for determining abrasion of coarse aggregate. The revision, which involves varying the size of the abrasive charge (number of steel spheres) for different gradings of aggregates, permits a wider range of gradings to be tested. Two new methods of test, covering modified miscibility and cement mixing of emulsified asphalt were also introduced. The committee had previously presented to the standards committee two tentative specifications for cutback asphalt, covering rapid curing and medium curing types.

Bituminous Waterproofing and Roofing Material. (Comm. D-8). In addition to advancing nine of its tentative standards to standard the committee revised four tentative standards relating to asphalt shingles and roofing by including more definite requirements concerning weight and size of mineral surfacing materials.

Soils. (Comm. D-18). A list of proposed definitions and symbols relating to soil mechanics was made available for information and discussion, and one of the subcommittees has submitted a new method of test for compaction and density. Plans are under way for a symposium on tests of soils to be presented at the next annual meeting.

Methods of Testing. (Comm. E-1). Developments reported by this committee include: (1) formulation of a program of investigation bearing on the measurement and significance of hydrogen ion (pH) values of water and various solutions; (2) completion of a report on effect of specimen size and shape on measured tensile properties; (3) continuation of the studies of the correlation of the several types of hardness tests; presentation of a method of tension testing to determine effect of rate of strain in which an extensometer and a stop watch replace the more elaborate oscillograph recorder.

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Maryland opens new dual highway link on Route 40

Maryland's new dual highway link, extending 47.19 mi., from the Baltimore city line to the Delaware state line, was opened to traffic for the first time on June 26.

The road was dedicated with appropriate ceremonies when Governor O'Conor cut a ribbon stretched across the dividing line between Maryland and Delaware on Route 40. The delegation attending the ceremonies was welcomed at the Delaware line by Governor Bacon of that state.

Construction of the dual highway cost $7,300,000, and is the biggest project ever undertaken by the Maryland Roads Commission.

Congress provides funds to increase CAA airport program by fifty percent

Aeronautics authority gets $94,878,000, and in addition WPA will spend about $40,000,000 on the same program. Although the airports are for civilian needs, they are also selected for military use

Final Congressional action on the Commerce Department appropriation ensures that the Civil Aeronautics Authority's program of building and improving civil airports with emergency military value will be greatly increased. Congress has provided $94,978,000 for CAA, and in addition WPA will spend about $40,000,000 on the same program. This will be enough to complete the 250-airport program started last year and to carry out an additional program of improving 149 other airports.

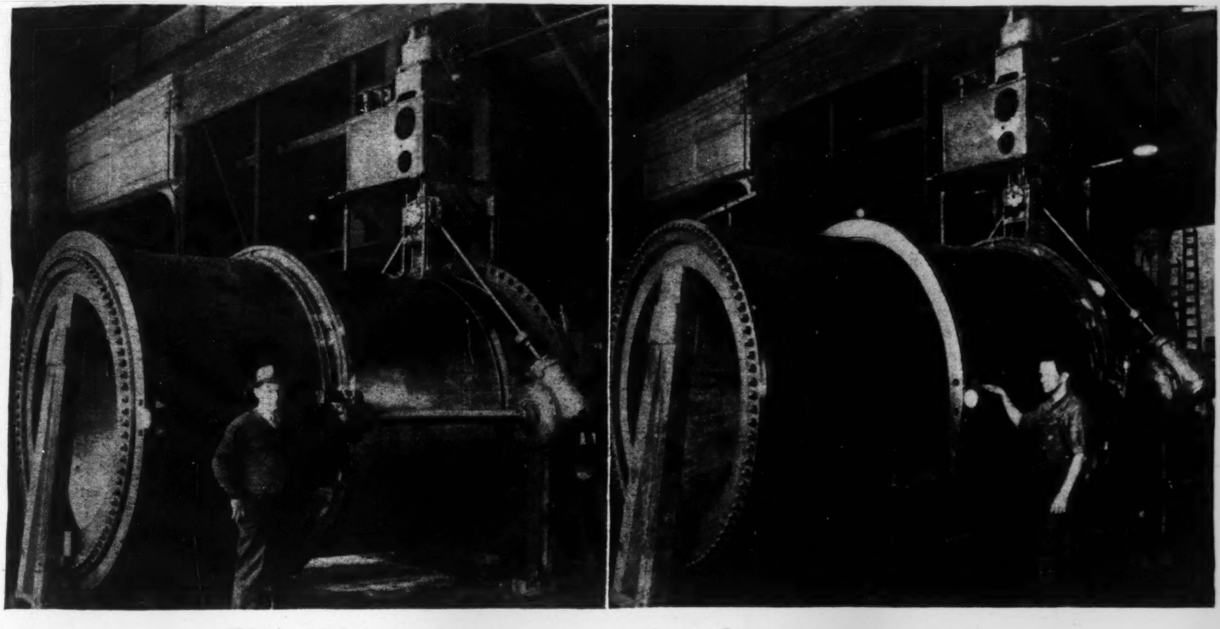
Federal construction of airports, apart from relief work, started last year under a program for which CAA was given $40,000,000 to start the improvement of 250 fields. Some $9,000,000 was also furnished by WPA. Under this program, federal money is spent only for construction and equipment; local interests furnish the land.

Selected for military value

Although the airports are intended for civilian use, they are selected with an eye to military value by a board consisting of the secretaries of War, Navy, and Commerce. In about half the projects, the Corps of Engineers acts as agent for CAA in drafting the plans and letting contracts. In a somewhat smaller number of cases, where WPA already has a project underway at the field to be improved, CAA funds are turned over to WPA and used to supplement the project. In a few cases CAA itself designs and lets contracts for the job. (*ENR*, Apr. 17, 1941, p. 7).

This year, some $70,000,000 or $80,000,000 was required to finish the 250-field program. Congress and the budget bureau cut this to $33,500,000 and directed that the rest of the cost be met from WPA funds. Last month, while the bill was on its way through Congress, the President asked for an additional $61,478,000 to improve 149 more fields. This was inserted in the bill.

At present, CAA is making preliminary surveys of some 191 airports to provide data on the basis of which the selection board can choose 149 to be improved.



Three 96-in. valves to control Mud Mountain Dam flow

Normal discharge at Mud Mountain Dam, which is being built on the White River near Enumclaw, Wash., as the world's highest rock fill dam (ENR March 13, 1941, p. 410), will be controlled by three 96-in. Howell-Bunger valves of the type shown above. Water will flow from right to left, open position of the valve being illustrated at the right and the closed position at the left. The valves are to be tested under a pressure of 200 psi. and are to operate under a 340-ft. head. They will control flow in the three 8-ft. steel pipes extending downstream from a plug near the center of the 23-ft. tunnel used to bypass the river's flow during construction.

A discharge coefficient of 90 percent has been specified for the gates by the manufacturers, S. Morgan Smith Co., York, Pa., but the coefficient may go as high as 95 percent. The gate of each valve is hydrostatically balanced so that the principal resistance to operation is friction at the packing box at the gate's upstream end. This makes possible an operating unit of relatively low capacity; with the valve shown a 15-hp. motor will be used, which can open or close the valve in about 7½ min.

Flanged steel plates rolled to shape and welded are used for the valve's body and gate. After being welded these members are stress relieved in a furnace at 1,150 to 1,200 deg. F. for a period of one hour per maximum inch of metal thickness. The valve bodies are lined with bronze throughout the length over which the gate slides.

Advantages claimed for Howell-Bunger valves over other free discharge types are: low initial cost, high discharge coefficient, simple construction, and ease of maintenance.

The first installation of Howell-Bunger valves was made in 1935, two 48-in. units operating under a 150-ft. head at El Vado Dam in northern New Mexico. Since then the valves have discharged some three-quarters of a million acre-ft. but no trouble from vibration or cavitation has been noticed. Erosion in the river bed and canyon below has been negligible, and operation has been characterized by complete lack of trouble due to hydraulic defects. Howell-Bunger valves were invented by C. H. Howell and H. P. Bunger, while chief engineer and designing engineer, respectively, of the J. G. White Engineering Corp., S. en C. of Mexico City. Both have served with the U. S. Bureau of Reclamation.

Wappapello Dam to be dedicated July 4

The Wappapello Dam on the St. Francis River, near Poplar Bluff, Mo., first flood control unit of the kind in the state, will be dedicated to public use with an appropriate program on July 4. Governors of Missouri and Arkansas, flood control advocates in Congress and officials of the Mississippi River Commission will be invited. The project has been completed except for a beautification program and some minor work. (See *ENR* May 29, 1941, vol. p. 850.)

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Good safety record set on defense work

Out of an average daily force of 394,000 men who have worked 94 million hours on all types of army construction throughout the country since the first of the year only 2½ percent have been injured in action, according to the War Department. This fine record of construction safety is attributed to the safety unit of the construction division of the Quartermasters Corps which has conducted an intensive campaign to prevent accidents during the emergency building program.

Besides requiring contractors to abide by safety regulations, the safety unit has made a careful study of accident reports so that further precautions can be taken. Another part of the work is control of motor and pedestrian traffic in and about army camps and defense plants. Military authorities are cooperating in this program with the public safety division of the National Safety Council. Safety work has been especially effective at the Elwood and the Kankakee Ordnance Works, near Joliet, Ill. At the latter plant the number of lost-time accidents by the 8,000 construction workers has been negligible, and only one fatality has occurred, when a truck driver was hit by a passenger train.

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Injunction issued against Arkansas road commission

Chancellor Frank Dodge of the Pulaski Chancery Court, Little Rock, Ark., has issued a permanent injunction restraining the Arkansas Highway Commission from carrying out a contract to furnish the city of Augusta with approximately 1,750 tons of hot asphalt mix for a paving project. The chancellor had on May 14 issued a temporary injunction on the plea of J. A. Gregory, Jackson County contractor. Judge Dodge said in issuing the decree "The Highway Commission has no authority to execute a contract for the sale or disposal of material owned by the state or for use of equipment or labor owned or employed by the state."

JOBS OF THE WEEK

EMBARKATION PORT, New Orleans, La.

Stevens Brothers and Miller-Hutchinson, New Orleans, La., will construct additional work at Port of Embarkation, including buildings and facilities for War Department, Washington, D. C., $1,259,950. Gardner & Howe, Memphis, Tenn., have contract for architectural and engineering services.

HOUSING, Vallejo, Calif.

Barrett & Hilp, San Francisco, Calif., will construct nine hundred ninety-two dwellings for civilian employees for Federal Works Agency, Washington, D. C., at $2,790,000 and seven hundred dwellings awarded to Robert McCarthy, San Francisco, at $2,025,100.

SCHOOLS, Scott Field, Ill.

O'Driscoll & Grove, Inc., New York, N. Y., and St. Louis, Mo., was lowest bidder constructing six radio schools at Scott Field, at $990,000. U. S. Engineers, St. Louis, Mo., took bids.

FACTORY, Wichita, Kan.

The Austin Co., Cleveland, O., will construct 200x1,000 ft. and 100x100 ft. airplane factory addition for Stearman Aircraft Corp., Division Boeing Airplane Co., Wichita, Kan. Estimated cost $1,000,000.

BARRACKS, MESS HALLS, etc., Camp Lee, Va.

Doyle & Russell, Richmond, Va., was awarded contract by Constructing Quartermaster, Camp Lee, for additional barracks, mess halls, officers quarters and other buildings at $1,400,000.

NORTH TUBE, LINCOLN TUNNEL, New York, N. Y.

George J. Atwell, Foundation Corp., New York, N. Y., will construct steel bent section of north tube Lincoln Tunnel, and New York Plaza east of 11th Ave. for Port of New York Authority, New York, at $938,392.

ORDNANCE PLANT, Milan, Tenn.

H. K. Ferguson Co., Cleveland, O., has been awarded contract for design and construction additional buildings for Wolf Creek Ordnance by War Department, Washington, D. C. Estimated cost is $5,389,000. Procter & Gamble, Cincinnati, O., will operate.

HOUSING, Rolla, Mo.

Barrett & Hilp, San Francisco, Calif., has been awarded contract for the construction of five hundred dwellings, for army civilian employees at Fort Leonard Wood by Federal Works Agency, Washington, D. C., $1,465,500.

SANTA FE DAM, Los Angeles, Calif.

Morrison-Knudsen Co., J. F. Shea Co., Inc., Ford J. Twaits and Winston Bros., Los Angeles, Calif., have been awarded contract for the construction Santa Fe Dam by U. S. Engineers, Los Angeles, $8,837,199.

BUILDINGS, Camp Blanding, Fla.

Watt & Sinclair, of Florida, Inc., Palm Beach, Fla., constructing barracks, recreation buildings, chapel, officers' quarters, nurses' mess, etc., for Constructing Quartermaster, Camp Blanding, $1,023,774.

OFFICE BUILDING, Suitland, Md.

John Kennedy & Co., New York, N. Y., is lowest bidder constructing federal office building for Public Buildings Administration, Washington, D. C., $2,980,000.

PIER and WAREHOUSE, Bremerton, Wash.

Sound Construction Co., Seattle, Wash., and Peter Kiewit & Son, Omaha, Neb., were lowest bidders constructing supply pier at $1,947,700; Howard S. Wright & Co., North Seattle, and L. H. Hoffman, Portland, Ore., were lowest bidders on storehouse at $2,194,550. Bids were taken by Puget Sound Navy Yard for Navy Department.

RUNWAYS, Riverside, Calif.

Matich Brothers and E. L. Yeager, Riverside, were lowest bidders constructing runways at March Field, when U. S. Engineers, Los Angeles, opened bids. Low bidder was $982,200.

ADMINISTRATION and STOREROOM, Ford Ord, Calif.

Ford J. Twaits Co. and Morrison-Knudsen Co., Los Angeles, have been awarded contract for one hundred twenty-four buildings by War Department at $941,812.

NOTE—Additional bidding and contract news on over 800 projects large and small appear in the Construction News section beginning on page 113.

OBITUARY

Stuart Kelsey Knox, consulting engineer, specializing in hydraulic and sanitary engineering, died June 28 at Montclair, N. J. He was 62, and a graduate from the University of Michigan in civil engineering. Before opening his own consulting engineering office in New York, he had previously been associated with the well known construction firms of Thompson-Starrett Co., the Foundation Co., and Nicholas S. Hill, Jr., Engineering firm.

Samuel J. Humes, Seattle engineer and Washington state highway director from 1927 to 1932, died June 26 at Seattle. Mr. Humes received his engineering education at the University of Washington.

Alan Macdougall Jones, prominent consulting engineer, died June 3 in Quebec City, at the age of 66. Mr. Jones was widely known throughout the United States and Canada as a railway and canal engineer. He was educated at Upper Canada College, and the Royal Military College at Kingston.

Raymond C. Allen, 63, for many years engaged in civil engineering practice along the Boston North Shore, died June 20 at Manchester, Mass. He was a graduate of Brown University in 1897.

Homer Rupard, 41, assistant engineer of the Indianapolis Water Co., died June 25 at Indianapolis, Ind. He had been with the water company since 1923.

James J. McDonald, civil engineer, died June 22 at Little Rock, Ark. Mr. McDonald was project superintendent and engineer for the U. S. Fish and Wild Life Service.

Ceth D. Peacock, 56, Columbia, Mo., civil engineer, died at Fort Smith, Ark., June 20.

Jonas Myerson, 53, civil engineer, died June 23 at New York, N. Y. Mr. Myerson was associated with the board of water supply.

James J. Ronayne, an engineer in the service of the Sanitary District of Chicago for several years, died June 20 at Chicago

CONTRACTS AND CAPITAL

Engineering construction awards for the short week due to the early closing for the Fourth of July holiday total $74,209,000. This is 135 percent greater than the volume reported for the 1940 week.

Public construction is 165 percent higher than in the 1940 week, and private awards are up 44 percent compared with a year ago.

The week's total brings 1941 construction to $2,915,612,000, an increase of 105 percent over the 27-week period last year. Private awards, $745,805,000, are 51½ percent above the 1940 period. Public construction, $2,169,807,000, tops last year by 134 percent, as a result of the 576 percent gain in federal work.

In the classified construction groups, the only gain over last week is in earthwork and drainage, and it is due to the $8,837,000 award for the construction of the Santa Fe Dam in California. Gains over the corresponding 1940 week are in sewerage, commercial buildings, public buildings, earthwork and drainage, streets and roads, and unclassified.

New capital for construction purposes totals $476,758,000 for the week, an increase of 131 percent over the total reported for the week last year. The current week's financing is made up of $163,000,000 in federal aid for highways, $150,000,000 for local public works necessitated by defense expansion, $139,388,000 in corporate security issues, and $24,370,000 in state and municipal bond sales.

New construction financing for the year to date, $3,827,302,000 is 357 percent above the volume for the 27-week 1940 period.

CONTRACTS

(Thousands of dollars)

	Week Ending July 4 1940	June 26 1941	July 3 1941
Federal	$2,588	$95,318	$45,357
State & Municipal	21,118	32,130	17,465
Total public...	$23,706	$127,448	$62,822
Total private..	7,893	16,072	11,387
TOTALS	$31,599	$143,520	$74,209

Cumulative
1941 ......(27 weeks).... $2,915,612
1940 ......(27 weeks).... $1,421,215

Note: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

NEW PRODUCTIVE CAPITAL

	Cumulative 1940 27 weeks	1941 27 weeks
NON-FEDERAL	$831,956	$785,965
Corp. Securities....	92,225	277,590
State & Mun......	461,542	278,602
U.S.H.A. loans.....	87,204	30,399
R.F.C. loans.......	6,985	35,874
R.E.A. loans........	....	500
Federal Aid—Hwy..	184,000	163,000
FEDERAL	$7,000	$3,041,337
TOTAL CAPITAL....	$838,956	$3,827,302

FHA MORTGAGES

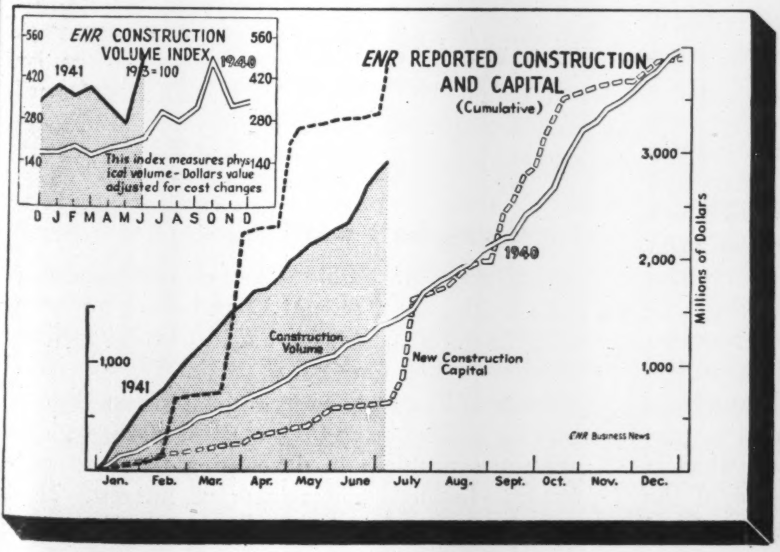
	Week Ending June 29 1940	June 21 1941	June 28 1941
Selected for appraisal ...	$27,464	$33,797	$33,500*

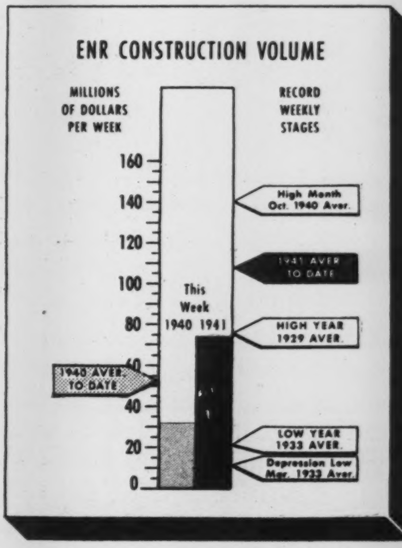
Cumulative
1941 .....(26 weeks).... 752,267*
1940 ......(26 weeks).... 636,321

* Subject to revision.

ENR INDEX NUMBERS

Index Base=100		1913	1926
Construction Cost..	July '41..	258.18	124.11
Building Cost.....	July '41..	210.22	113.64
Volume	June '41..	492	216





EDITORIALS

VOLUME 127 NUMBER 1

July 3, 1941

Post-War Planning

ESTABLISHMENT of the Public Works Reserve, as announced last week, to create a reservoir of public works that can be carried out in the post-war period, is a long step forward in the work of converting abstract planning into concrete results. The only unfavorable element of the plan that appears at the moment is that it is to be launched with WPA as the sponsor just because WPA happens to have money that can be used for that purpose. Such sponsorship at once creates the impression that projects for which plans are to be prepared are to be work-relief undertakings—which is not now proposed. To enlist the public support that is needed, the projects should be kept as free from the WPA as possible. If Congress thinks the undertaking worth-while it can provide funds quickly. But this bad start should not be permitted to obscure the fact that the Public Works Reserve has great possibilities for good. Advance planning in the past has been too abstract. If the present plan to loan moneys to federal, state and local agencies for actual plans and specifications is approved by Congress, many projects all over the country can be made ready for a quick start when economic conditions need the stimulant of increased construction.

Dynamic Bridge Model Tests

RESPECTFUL ATTENTION to model studies has been earned in recent years by the helpful advance information model tests have brought designers and builders. The late Prof. Beggs contributed much in the field of bridge model studies; important groundwork has been laid in methods for stress analysis with the aid of polarized light on plastic models; and the collapse of the Tacoma Narrows Bridge focused a great deal of attention on dynamic model studies, particularly three-dimensional models having definite relationship to prototype in periodicity and force scales as well as in linear dimensions. Even before collapse of the Tacoma Narrows Bridge, a three-dimensional model of this type had been built and was being studied at the University of Washington—perhaps the first of its kind ever to be conceived. Building on this foundation of experience, the large wind velocity machine for bridge model tests, now proposed by Prof. Farquharson (and described in this issue) transplants the wind tunnel of the aerodynamic engineer into the civil engineering laboratory where the plan is to adapt it to the lower speeds, larger dimensions and controllable wind direction requirements that it would be difficult, if not impossible, to meet in wind tunnels suited to airplane needs. Doubtless there is much yet to be learned about technique in this new branch of the model field; also there is much valuable information to be obtained, which will be the reward for effective development of methods and scientific interpretation of test results.

Wellpoints Versus Cofferdam

A VERY IMPORTANT SAVING in time plus a large saving in cost resulted from working with wellpoints instead of waiting to build a cofferdam around the San Diego drydock described in this issue. Despite the fact that at this site conditions are not favorable to wellpoint operation (the material is highly diversified, contains many impervious lenses and water inflows are relatively small), the system has been made to work satisfactorily in successive depth stages, unwatering to El. —45 a relatively large area in soft material along a tidewater shore. The talent and technique brought together on this emergency assignment obtained good results on a scale of wellpoint operation rarely if ever attempted heretofore. Success on this job paves the way for making these advances a part of standard practice in foundation work. The national defense emergency is an incentive to speedier methods in many phases of construction. and under this pressure permanent benefits will often accrue as opportunities and talent are brought together.

Surveying Gets a Lift

TO SERVE one of the oldest recognized branches of engineering, the National Congress on Surveying and Mapping takes its place among technical societies (*ENR*, June 26, p. 981). The diversified interests of its membership, which includes the ordinary lot surveyor and the cadastral mathematician, present a problem in developing the most satisfactory common denominator of interest. Those instrumental in forming the new organization recognize this fact. The real service to be performed lies in the guidance it may be able to offer to both surveyors and mappers in producing more accurate and permanent records of their work. Next in importance will be the contribution of the organization toward eliminating the existing wasteful duplication in surveys and mapping through closer integration of the activities of the many agencies doing such work. These opportunities for service to members and the public provide the new organization with an ample field for a long program of sound and creative effort.

Toward Better Concrete

EVIDENCE is gradually being accumulated favoring additions to cement of minute quantities of fatty or resinous materials as a means of improving concrete durability. The latest tests, reported in this journal two weeks ago by M. A. Swayze, director of research, Lone Star Cement Corp., supplement and generally support the findings, reported previously, of other cement company and highway department studies with respect to additions that introduce a small percentage of air into concrete. All of this research is important not alone for the significant and promising conclusions that it is bringing forth but also because it reflects a new philosophy toward concrete improvement, a philosophy that in effect removes a detour sign that for years blocked any questioning of the standard specification of portland cement.

In seeking better concrete, the aggregates and water and mixing, placing and curing were recognized as fair game for investigation but the cement was inviolable. User as well as manufacturer subscribed to this idea. So long as the cement gave a definite strength in a given time it was acceptable. And since all cements readily met this requirement a fixed and single standard was acceptable too.

A portland cement specification that was not continually being revised had its good points, to be sure. One of these was that manufacturers could concentrate on production economies, which they did to the benefit of the consumer. Concrete research may or may not have been advanced by eliminating the cement as a variable, but the time came when more knowledge of cement was mandatory. Spurred by Boulder Dam requirements for a low-heat cement, manufacturers speeded up the study of compound composition out of which came the useful specifications for special cements for special purposes. Last week the final step was taken when the A.S.T.M. conferred standard status on a new specification for portland cement, which covers five different types of product and thus marks complete abandonment of the single standard idea.

The present studies, involving the addition of minute quantities of admixtures to standard portland cement (of which vinsol resin appears to be the most promising) have a new purpose in mind. Here manufacturer and user are cooperating in an effort to secure greater concrete durability. So far the tests have been confined to concrete for pavement slabs, whose durability seems definitely improved, but whether similar advantages accrue from using "treated" cement in structural concrete remains for further tests to demonstrate. The important facts to be noted are that admixtures in cement are being accepted and that minute quantities of them admittedly do things to cement. In contrast to the additions that change cement, other studies have indicated that minute subtractions of the already existing minute quantities of sodium and potassium oxides also improve concrete that has to be made with certain alkali-reacting aggregates.

Now the question will logically be raised whether there are not other elements which, through minute additions (or perhaps subtractions) will contribute useful qualities to cement. Undoubtedly there are, and they should be ferreted out, always remembering, however, that changes in manufacturing methods and a multiplicity of types of cements are apt to raise costs. Whether a change is economically feasible, however, is a question that comes later. At present the question is one of physical scope only.

In last year's Marburg Lecture before the A.S.T.M., P. H. Bates discussed this question of cement admixtures. "Maybe," said Mr. Bates, "there is an admixture whose use will give us within a day the strength usually attained at the end of a year." *Maybe* is a perfect word for any research man to embrace. Once the spirit which this word expresses becomes dominant in the laboratory and in the field, the road toward better concrete is wide open.

ENGINEERING NEWS-RECORD

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Hauling was a problem at Camp San Luis Obispo where roads were like this during a 3½-month rainy season.

Heavy Equipment Beats Army Camp Mud

Contents in Brief—*Heavy construction equipment valued at more than $2,000,000 was brought together at Camp San Luis Obispo, Calif., to combat unfavorable conditions on 3,000,000 cu.yd. of grading and other preliminaries for a "permanent tent camp". Although the housing is under canvas, this 20,000-man camp required unusually extensive preparation for water supply, sewage disposal and transportation and is costing about $16,300,000. Despite 3½-months of storms that prevented pavement construction, the first troops moved in Mar. 8, on schedule; construction was 83 per cent complete on April 22, and the original contract completed early in June.*

CHORRO CREEK VALLEY, just north of San Luis Obispo, Calif., which has been used for some years for summer encampments of the National Guard, was selected as the location for one of the 20,000-man "permanent tent camps" and was required to be ready for troops on Mar. 8. As the site is on a railroad, had already been used for military maneuvers and is in a "southern" location so that tent housing is acceptable, it might be assumed that the necessary facilities could be completed speedily and easily. When the contract was awarded Oct. 5, date for completion was set for Jan. 2. However, while plans were still incomplete, an entire rearrangement of camp layout was decided upon and before any considerable amount of work could be done, an unusually rainy season began which continued for 3½ months, developing a condition in the prevalent adobe formation that reduced to less than one-half normal the efficiency of men and equipment working on grading and foundations.

PARTIAL LIST OF EQUIPMENT USED AT CAMP SAN LUIS OBISPO.

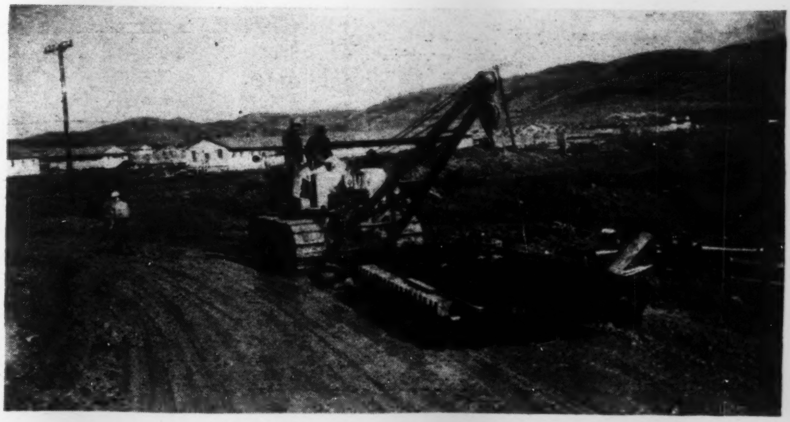
Tractors (chiefly 80-hp. diesels)	104
Trenchers	9
Crawler cranes	4
Power rollers	6
Pile drivers	5
Truck cranes	4
Carrying scrapers (up to 35-cu.yd.)	36
Grease trucks	6
Lumber carriers	5
Air compressors	12
Motor trucks (up to 25-cu.yd.)	265
Portable lighting plants	33
Power shovels	5

Under more favorable conditions or with more time, the work could have been done at lower cost and with much less equipment, but to meet the troop induction date of Mar. 8, the entire West Coast was combed for equipment until a total of $2,000,000 worth of heavy construction machinery had been brought to the job and concentrated on preliminaries, more particularly the 3,000,000 cu. yd. of grading and excavation.

In plan, the camp layout somewhat resembles a flat-sided figure 8, the central constriction resulting from steep slopes in the valley sides which range up to 20 percent. The upper or eastern area, nearer the railroad where are located the headquarters and administration buildings, comprises 250 acres and in the lower valley, covering some 550 acres, are warehouses, parade grounds, repair depots and a large part of the tent quarters for troops. Adjoining these 800 acres of improved area is a 4,200-acre government reservation. Separated geographically but included in the camp contract is the 160-acre airport, 30 miles to the north, with quarters for officers and men of the 115th observation squadron. There, in addition to other buildings, a 120x160-ft. hangar is required.

Camp San Luis Obispo, including the airport, requires 4,700 tent frames, 153 mess halls, 31 warehouses, 13 igloos (for ammunition storage), 14 detached officers' quarters, 10 recreation buildings, 166 lavatories, 59 hospital buildings and 25 headquarters buildings. The total number of buildings, other than tents, is 528. The large number of 5-man tents that constitute the bulk of the housing facilities are arranged in the standard camp pattern. In low-lying areas, duckboard sidewalks connect them with the lavatories, mess halls and other buildings. The tents have floors and wainscoting of wood above which is the galvanized screen zone and a timber framework for the canvas covering. Each tent has electric light and a fuel-oil heater.

As the camp is for motorized troops exclusively, extensive provision is made for vehicular equipment. There are 13 parking areas with a total of 14 gasoline filling stations. Gasoline storage at these stations is of two types, according to requirements: some have two and some have four 5,170-gal. tanks. Including a 72,000-gal. central storage tank near the depot, the camp has capacity for storing 247,780 gal. of gasoline, all underground.



When no other vehicles could get through, tractors towed materials on sleds.

The train that brought in ballast, to be dumped between the rails, caused the subgrade to squash up between the ties.

Equipment and materials

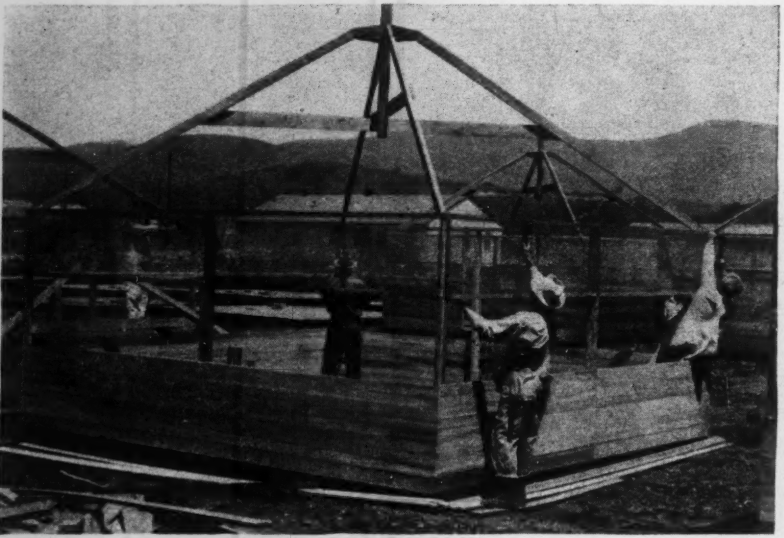
The rainy season which continued for 3½ months so thoroughly saturated the prevailing adobe soil that all earthmoving operations in the early stages of the job were a slow and expensive process. The contractor's own plant plus that rented for the job included more than 800 pieces of heavy construction equipment of which about half, in value, were tractors equipped for earthmoving. Other earthmoving equipment made up a large part of the total. For example, there were 36 carrying scrapers ranging in capacity up to 35 cu. yd. and 76 dump trucks of which 22 had 25-cu. yd. bodies. An indication of the kind and quantity of this heavy equipment is given in the accompanying table. The contractor's equipment-repair yard not only serviced and maintained this fleet but built up specials such as the welded-pipe end- and side-booms attached to tractors for pipe laying.

About 26,000,000 b.ft. of lumber was used, of which 18,500,000 b.ft. went into tent-frame and building construction, while railroad trestles and camp road bridges accounted for a considerable part of the remainder.

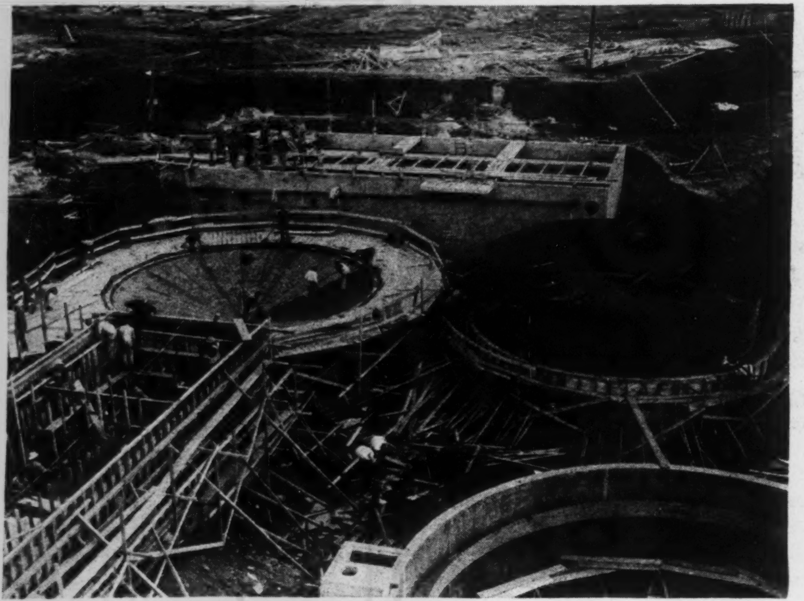
When work was at its peak the total number of men employed was about 6,700. The maximum number of carpenters was 1,600. Although some lumber was precut, notably tent floors and frames, most of the cutting was done at the building site. Toward the close of the construction period, salvaged lumber was cleaned and piled according to size and length. Remnants, rated as not worth cleaning, were piled in five "boneyards" at different parts of the camp where the scrap would be handy for later use by the army in making duckboards and other camp conveniences.

Water for the camp comes at present from (a) three wells, whence it is pumped to two 1-mg. steel tanks and (b) storage from the 3½-sq. mi. drainage basin of Chorro Creek, behind Chorro Dam at the upper end of the camp in a 208-acre-ft. reservoir. The dam is 65 ft. high and consists of some 150,000 sq. yd. of rolled fill with a central concrete cutoff wall. The spillway, which has a capacity of 7,000 sec.-ft., contains more than half of the 5,000 cu. yd. of concrete used in and around the dam. There are two chlorination plants; a water softening plant is under construction to improve the water.

This water supply is not adequate for a series of dry years and consideration is being given to a supply from the Salinas River about 12 miles away, which would have to be pumped against a 200-ft. lift to make delivery through a 5,000-ft. tunnel in the Santa Lucia mountain range to Chorro reservoir. The Salinas source would supply about 8 mgd. through a 24- and 18-in. pipe (gravity and



Erecting one of the 4,700 "permanent tent" frames.



A general view of the trickling filter sewage disposal plant.

pressure sizes, respectively). The line would be made up of about 10 miles of pipe, 1 mile of lined tunnel and 7,000 ft. of open channel. Consideration is being given to making this project a joint development, in cooperation with nearby communities in need of additional water.

Sewage disposal

Figuring the usual 70-gal. per capita per day, the 20,000-man camp should have sewage disposal capacity of 1,400,000 gpd. A trickling filter plant of this size with chlorination before discharge has been built at the extreme lower end of the camp where a gravity system can reach it and yet where it can discharge into Chorro Creek. The plant site is on the creek bank where a bench cut about 20 ft. below grade provides area for four circular trickling filter tanks 90 ft. in diameter, two steel digester tanks of 35-ft. diameter, two 15x60-ft. concrete tanks for primary sedimentation, and incidental structures.

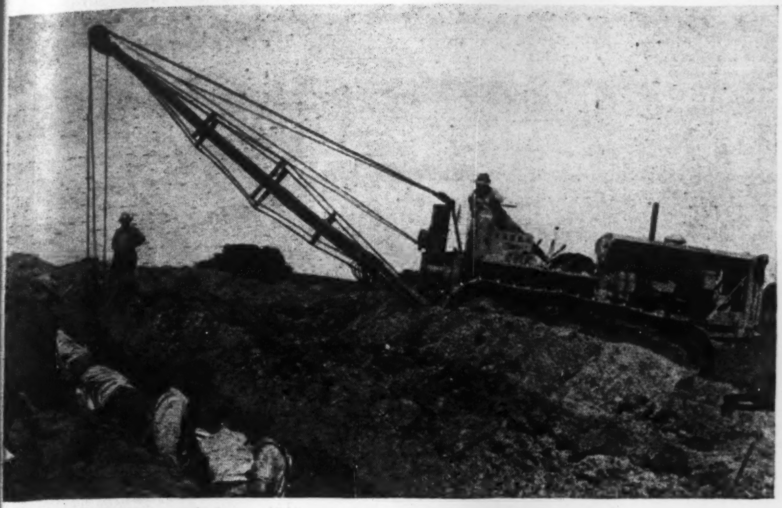
In preparation for the plant it was necessary to excavate 80,000 cu. yd. and stabilize a foundation that was largely a mud pocket. This stabilization was effected by driving 9,200 piles consisting of rough 4x4's, 16 ft. long, driven on 2-ft. centers, both ways. As these are for stabilization—not for bearing—they were topped over with 12 in. of red rock and concrete slabs poured thereon. Under the final sedimentation tank, because of the weight concentration, a 4-ft. gravel layer was placed before the concrete was poured. The foundation problem at the sewage plant was put in the hands of R. V. Labarre, Los Angeles, who developed the plan outlined above.

Asphalt and concrete pavement

Delays at the start of the project that threw the construction period into the rainiest winter season in many years made it impracticable to lay concrete or asphalt surfacing at the outset and grading was carried on only under the greatest difficulty. In the absence of paving of any kind, tractors often slithered through the mud hauling materials on timber sleds usually about 7x10 ft. in size. Duckboards were required by workmen in placing the concrete footings for buildings. The tent structures rest on redwood sills and the absence of concrete made it possible to proceed on these despite the weather. However, in many cases lumber for the tent frames and buildings had to be carried considerable distances by the workmen themselves.

No paving was laid until Mar. 25, more than 2 weeks after the first troops were housed. Then, in dryer weather, construction started in earnest on some 23 miles of paving including 9,000 cu. yd. of concrete in 8–6–8-in. and 9–7–9-in. sections as well as some 30,000 tons of asphalt laid in a 2-course, 4-in. pavement. Both asphaltic and concrete pavements are on bases consisting of a minimum of 12 in. of rolled red rock. In addition to these roadways, some 32 acres of motor parking areas are surfaced with a minimum of 12 in. of redrock, rolled in. These areas are to accommodate the 3,100 vehicles which constitute the camp's mechanized equipment.

Concrete materials were brought to the road paving jobs in dry batches. For the asphalt paving, a "hot" plant with a capacity of 130 tons per hour was set up. Here the aggregates pass through a 5½x26-ft. dryer (rotary kiln) to a pug mill permitting delivery to trucks at 325 deg. F. after mixing with grade E asphalt. A feature of this plant is an air circulation system in which a fan driven by a 50-hp.



Job-built boom on a tractor aids in laying a water line.

motor draws all dust and fines out of the dryer and returns this material to the mix, thus saving desirable fines and keeping the plant clean and free from dust with its silicosis menace.

Railroad and other utilities

The camp laundry is in a 210x270-ft. timber building under a saw-tooth roof. The window sash are steel, which could be obtained more quickly than could wooden sash. The steel is expected to be better than wood in resisting laundry steam. The foundation for this building was so soft that the floor slab under heavy machines that have to be kept level was made 10 in. thick and two layers of $\frac{5}{8}$-in. steel reinforcing 10-in. on centers both ways were put in. The remainder of the structure has an 8-in. concrete floor.

Fuels for the several kinds of heating required at the camp were carefully compared. Steam was found most economical for the 800-bed hospital unit. Natural gas (11,000 B.t.u.) is provided for the laundry, for cooking in the mess halls, for the incinerator and for heating some special buildings. The standard 5-man tents are equipped with heaters burning fuel oil. The camp is served by gas lines coming from two directions, of 4- and 6-in. diameters, respectively. The incinerator is built to standard government specifications for 10 tons per 8 hr.

The original estimate for the railroad was based on the assumption that the camp warehouse spurs could be served by a short connecting track, but the rough terrain near the main line track of the Southern Pacific and the required location of warehouses near the camp's population center, necessitated construction of 3.2 miles of main spur track. Including a Y and sidings, the total track constructed was 6.2 miles and the cost $582,430. This railroad involved about 300,000 cu. yd. of grading, two pile trestles and a considerable amount of channel change for Chorro Creek. It connects with the mainline of the Southern Pacific (where the latter is on a 2.2-percent grade) by means of a Y which leaves the mainline on a 72-ft. fill ending in a 62-ft. rock cut.

By the end of April, at which time the camp had reached an almost 83-percent completion stage, there had been sufficient good weather to dry out the soil and permit the paving to move ahead at high speed. Work undertaken in the original contract was practically completed early in June and considerable additional work, started later than the initial program, is well under way.

Personnel

The L. E. Dixon Co., Los Angeles, holds the general contract for the camp construction which, including all equipment except in the kitchens, is estimated, on a cost-plus basis, to amount to about $16,300,000. This includes the 160-acre airport 38 miles to the north, with improvement specified for that location. W. N. Evans is project manager for the contractor and K. L. Parker is general superintendent. Some 16 or 17 subcontracts cover installation of equipment, roadbuilding and other subdivisions of the project.

The architect-engineer contract is held by Leeds, Hill, Barnard and Jewett, Los Angeles; A. F. Barnard, resident partner, Don Hull McCreery, senior office engineer, L. D. Davenport, senior field engineer, and Ray O. Kusche, site planner. For the Quartermaster Corps, U. S. Army, Major D. P. Lane is in charge as constructing quartermaster.

Break-Point Chlorination Favored in Indiana

BREAK-POINT CHLORINATION (*ENR*, April 11, 1940, p. 521) has found a very definite place among the treatment methods employed by the water purification plants of Indiana, according to B. A. Poole, chief engineer of the bureau of sanitary engineering. One-third of the surface supplies of the state having complete filtering equipment now use this method of treatment at all times or at least*for taste and odor control.

"When one considers that break-point chlorination was generally introduced to the waterworks men of Indiana only a little more than a year ago, this proportion seems even more surprising," reports Mr. Poole. Other plants are waiting upon additional equipment to start this treatment, and by next January half of the filter plants of the state will be using this form of taste and odor control, he states.

Many of the plants using break-point chlorination are quite small, operating only on a part-time basis. This fact alone speaks for the ease of controlling this treatment method by the "flash" orthotolodine test, which was developed by Paul Laux, of Anderson, Ind. Other reasons leading to the general and widespread acceptance of this form of treatment in Indiana are first, because the streams are subject to severe algal growths which give rise to obnoxious tastes; and second, because existing chlorinating equipment usually can be used with only minor changes or modifications.

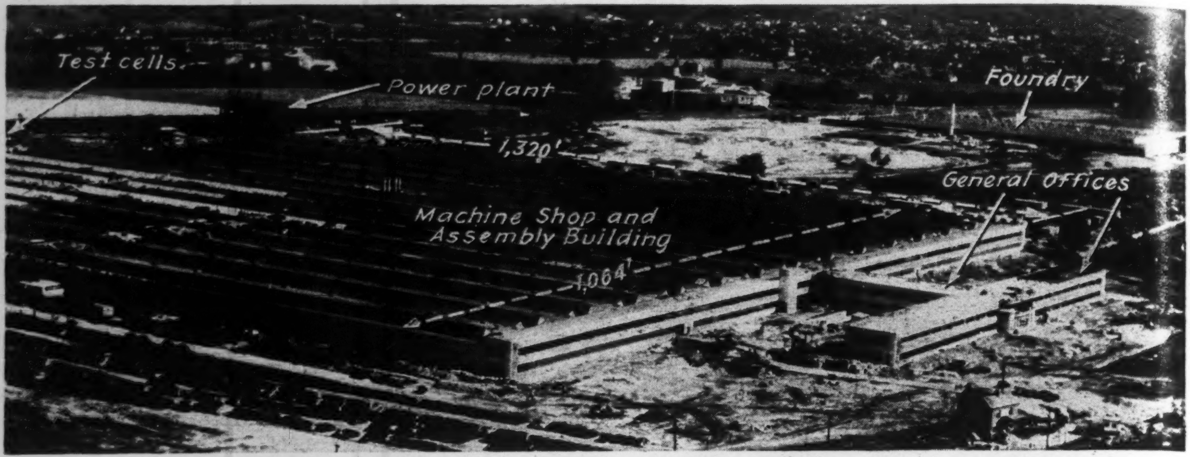


Fig. 1. Plant is laid out on 219-acre site with ample space for doubling plant's capacity if desired.

FACTORIES FOR DEFENSE

Wright Plant Sets New Size Record

Contents in Brief—*Although ground was not broken until last Oct. 23, Wright Aeronautical's Cincinnati, Ohio, airplane engine plant, covering nearly 50 acres, including the nation's largest one-story building, was sufficiently complete in June to turn out the first completed engines, two months ahead of schedule. Dividing the huge assembly plant into twelve areas and setting a deadline for each has made for rapid construction. Enclosing each area as it was completed by temporary partitions and using a railroad locomotive for a makeshift heating plant aided greatly in the early start on production.*

Now Nearing Completion as part of Wright Aeronautical Corp.'s $37,000,000 Cincinnati, Ohio, airplane engine plant is the nation's largest one-story industrial building. Measuring 1,320 x1,064 ft., the structure is to serve as the machine shop and assembly building of a plant to produce most of the parts and to assemble and test 14-cylinder, 1,700-hp. Cyclone engines. The structure provides 1,468,000 sq.ft. of floorspace or nearly 35 acres under one roof. The entire plant, located ten miles north of downtown Cincinnati, beside the old Miami and Erie Canal, will make available over 50 acres of floor area and is laid out, as indicated by Fig. 1, on a 219-acre tract for future systematic expansion to double the plant's capacity if required.

In addition to the main assembly building, to which is joined a two-story T-shaped reinforced-concrete office building providing 66,000 sq.ft. of floorspace and a 406x380-ft. wing to provide room for 74 test cells, construction includes a 250x640-ft., one-story, steel-frame foundry building; a 125x88-ft. power substation; a 150 x150-ft. power plant; storage for 350,000 gal. of gasoline; 5,400 ft. of drainage ditch of 28-ft. bottom width; 4 miles of permanent railroad track; 1¼ miles of sanitary sewers; 3 miles of water mains; and 33,000 sq.yd. of 8-in. reinforced-concrete roadway slab.

Materials required for all construction include: 100,000 cu.yd. of concrete, 4,000 tons of reinforcing steel, 10,000 tons of structural steel, 100,000 sq.ft. of window glass, 1,400 squares of roofing paper, and 5,000 tons of glazed hollow building tile.

That extremely rapid progress has been made is revealed by the fact that following ground-breaking ceremonies last Oct. 23, concrete placing began Dec. 17, steel erection Jan. 3, and installation of machinery Feb. 15. All major construction was completed in June, when production of ten engines per month started 60 days ahead of schedule. Peak production will be reached early in 1942 at the rate of 1,030 engines monthly.

A major problem

Major problem in getting the plant in operation was construction of the main machine shop and assembly building shown in Fig. 2. This was solved by: (1) dividing the structure into twelve areas with an individual completion date for each; (2) enclosing each area with temporary partitions as it was completed to permit installation of machinery; and (3) using a railroad locomotive for a temporary heating plant to permit early operation of machines. As a further aid in placing the machine shop and assembly building in operation, the production lines were laid out so that the completed areas could be placed in use as they were finished and then, when all twelve areas were complete, the machinery could be shifted with little cost and loss of time to bring the entire plant up to full production.

The machine shop and assembly building is of one-story steel-frame construction with reinforced-concrete floors, 8-in. hollow-tile exterior walls broken by a 7-ft. continuous band of steel window sash, and a monitor-type roof framing. Of special interest is the fact that 225,000 sq.ft. of basement space, which is an unusually large percentage of the total area for a one-story structure, is provided. This space is in the general shape of a large cross with its center near the center of the building. The basements are to accommodate pedestrian corridors and air-conditioned cafeterias and locker rooms, thus removing those facilities from the production floor.

To carry the heavy machinery loads several basement columns as large as 24x42 in., with eight 1-in. square bars for reinforcing, and designed to carry 210 tons each are used, as are a few 30-in.-diameter round columns designed for 270 tons. But of the total 318 columns required, 259 are 18-in. diameter, most of them reinforced with six ⅞-in. round bars. All columns are supported on spread footings varying from 6 ft. to 10 ft. square. The basement floor is a 6-in. reinforced-concrete slab with a 1½-in. concrete finish, and the basement walls are for the most part 10-in. reinforced-concrete construction.

Over much of the basement area columns on 20-ft. centers one way and 25-ft. centers the other way, ending in 8-ft. 6-in. drop panels, are used to support the ground floor, which consists of a 9 to 14-in.-thick flat slab with ⅝-in. round bars on 7-in. centers each way, and a 1-in. topping. For the remainder of the basement area reinforced-concrete beam and girder construction is used. Largest floorbeams required are 30x30 in., each with twelve 1¼-in. square bars for longitudinal reinforcing. Where there is no basement, the ground floor is of 6-in. reinforced concrete construction with one layer of 6-in. mesh reinforcing 4 in. below the surface.

Main roof trusses are of 60-ft. span and are on 76-ft. centers to make the ground floor bays 60 ft. east and west (long way of building) and 76 ft. north and south. Typical columns are 14-in., 60-lb. wide flange sections and outside the basement area the columns are carried on 7x7-ft. footings. The clearance between the lower chord of the roof framing and floor level is 18 ft.

Monitor trusses run north and south and are of 76-ft. span and 20-ft. spacing. Roofing consists of 2¾-in. precast concrete units, a 1-in. cork insulation and a four-ply built-up roofing covered by tar and gravel. For the monitor windows non-glare glass is used. The sash is being equipped with clip angles on the outside to permit covering them with sheet metal for blackout; the same blackout detail is used on the exterior-wall sash.

The office and underground areas of the machine shop and assembly building will be air conditioned. During the summer temperatures in the rest of the building will be controlled by chilled water at 45 deg. F. being circulated by two 6,000-gpm. pumps through 70 coolers distributed throughout the building. The chilled water will be supplied by five 1,200-ton refrigerator compressors located in the boilerhouse and driven by steam turbines. When heating of the same area is necessary hot water will be circulated through the same piping with supplementary heaters to be used at the outside walls.

Electric power for the building is supplied by six transformer substations located at as many different points on the roof with the incoming power reduced from 13,200 v. to 480 v. Lighting will be by fluorescent units of 200-watt capacity located on 12-ft. centers, except where concen-

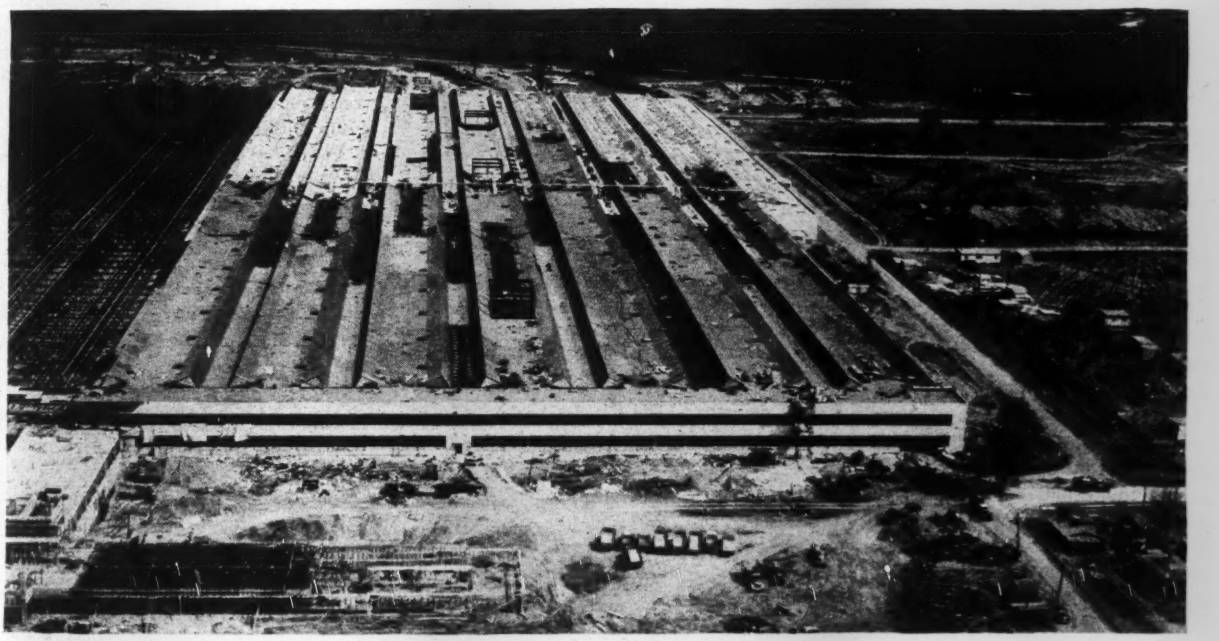


Fig. 2. Unusual size of machine shop and assembly building and rapid advancement in six months is revealed by this aerial view taken April 28, when 2,500 workers were employed. In immediate foreground T-shaped office building is under construction, while at far end work has been started on test cells and boilerhouse. Large square frames on roof of main structure are for transformers where incoming power will be reduced from 13,200 to 480 volts.

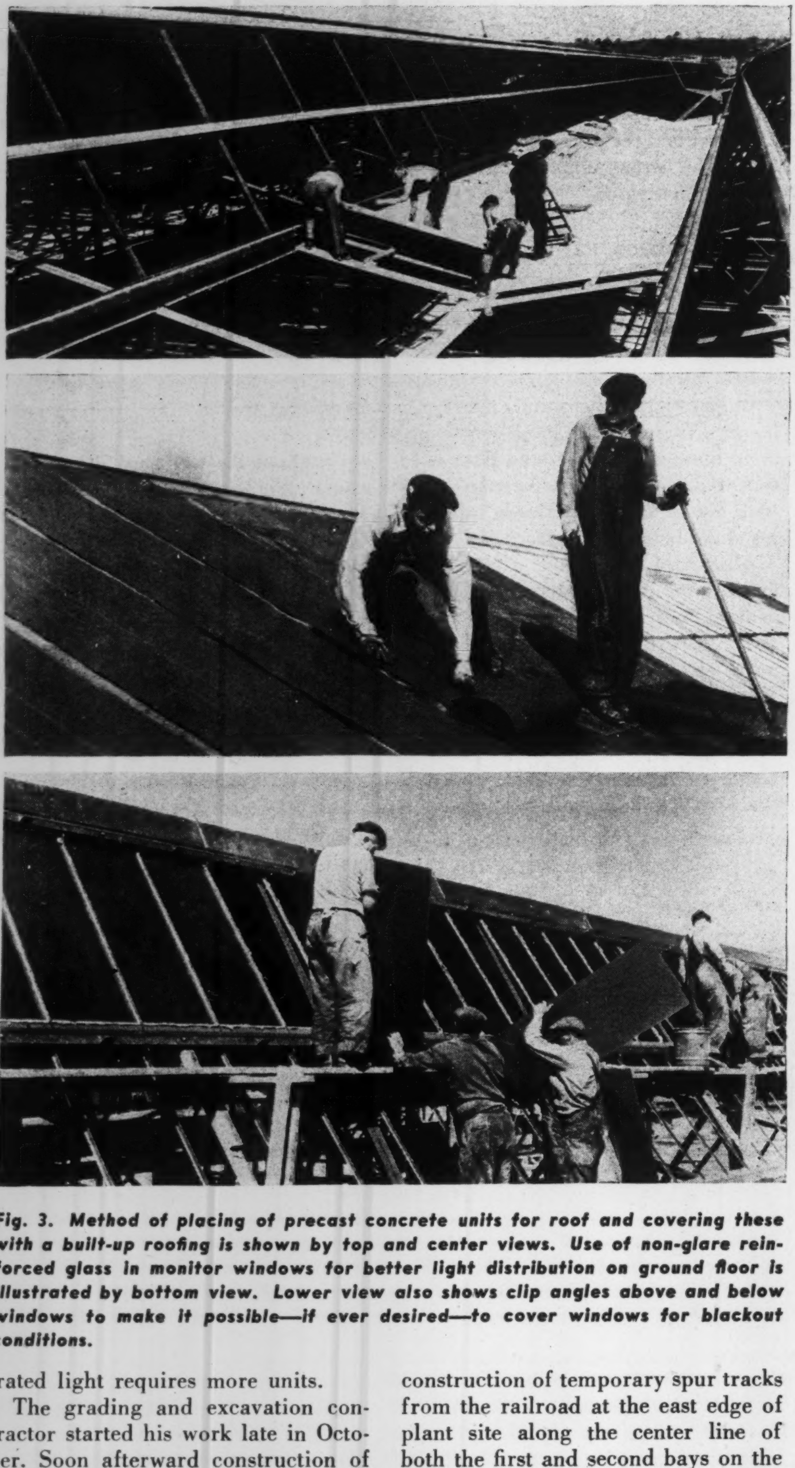


Fig. 3. Method of placing of precast concrete units for roof and covering these with a built-up roofing is shown by top and center views. Use of non-glare reinforced glass in monitor windows for better light distribution on ground floor is illustrated by bottom view. Lower view also shows clip angles above and below windows to make it possible—if ever desired—to cover windows for blackout conditions.

trated light requires more units.

The grading and excavation contractor started his work late in October. Soon afterward construction of the foundations, tunnels and basement was started. Transit-mix concrete was used. Slightly more than two months after ground was broken steel erection began. This work was done by four 20-ton crawler cranes with the booms varying from 60 ft. to 75 ft. and two 60-ton locomotive cranes.

First step in erecting the steel was construction of temporary spur tracks from the railroad at the east edge of plant site along the center line of both the first and second bays on the south side of the building. This permitted delivery of both the assembled monitor and main roof trusses within a short distance of where needed. Then as delivery of steel began by using these tracks two of the crawler cranes erected the columns and helped unload other steel. The locomotive cranes, working individually with one on each of the two tracks, erected the main roof trusses for the first two bays, while the remaining two crawler cranes at the same time worked individually to erect the monitor trusses. While steel erection continued in the first and second bays, temporary tracks were built along the center line of the next two bays to permit steel erection to continue without a let-up when erection of steel for the first two bays was completed. As erection was carried out in the third and fourth bays the two spur tracks in the first two were torn up and rebuilt in the fifth and sixth bays. Moving the temporary spurs over as work advanced was then continued for the rest of the job. Trestles were built across the excavated areas for the basement for all spur tracks.

Construction of the roof and walls was in step with steel erection, as was construction of the floor, which was with transit-mix concrete. Some days more than forty 2½-yd. to 3½-yd. trucks were in service delivering concrete for the floors. Peak labor force employed on the structure has been 2,500 workmen.

Artesian wells supply water

Water for domestic and industrial demands is to be obtained from six 26-in. gravel-wall artesian wells 150 ft. deep. To join the wells approximately 2,900 ft. of 12-in. steel connecting pipe is used, while 2,500 ft. of 16-in. distribution mains is to be required. Treatment calls for a lime-soda softening plant.

Sanitary sewer construction included 3,900 ft. of 18-in. lines. For lines under the buildings and under the railroad cast iron mains are used and for the remainder concrete. These lines were excavated with trenchers, and bulldozers were used for backfilling, the same as the procedure for the water lines.

For taking care of runoff 5,000 ft. of reinforced concrete and brick stormwater drains varying in size from 33 to 72-in. diameter was constructed in the same way as the sewers.

Personnel in charge

All buildings of the new plant were designed by Albert Kahn Associated Architects and Engineers, Detroit. Frank Messer and Son, Cincinnati, represented on the job by Gen. Supt. D. A. Johnston, was with Whitehead & Kales, River Rouge, Mich., the steel contractors, for the main building. For the foundry and test cell unit the general contractor was Mahoney Troast Co., Passaic, N. J., with Frank Yarwood, general superintendent. O'Connell & Sweeney, Cincinnati, held the contract for concrete pavements and Richter Transfer Co., Cincinnati, did the grading and excavating work. Wright Aeronautical Corp. was represented by the company's Cincinnati division manager, W. W. Finlay, while the Reconstruction Finance Corporation, which financed the project through its subsidiary, the U. S. Defense Plant Corp., was represented at the site by R. H. Dailey.

From an Editor's Notebook

City-Size Job for a Village

CHARLESTOWN, IND., is one of the nation's famous defense boom towns. When the War Department picked it as the site for an 86-million-dollar powder plant, the town had a population of 900; today it has 3,600 people and a lot of problems, with more of both to come, since operation of the powder plant and an adjoining bag-loading plant will require 12,000 employees.

Most pressing problem at first was housing, which was initially solved by the establishment of 21 licensed trailer camps with sanitary facilities to serve 753 trailers. Further aid is expected for the Charlestown area as a result of the allotment to it of 250 defense houses, 75 to be built at Charlestown, 75 at Jeffersonville, Ind., and 100 at New Albany, Ind. In addition Louisville, Ky., has been allotted 150 units for Charlestown employees. To prevent substandard housing within the town all proposed construction is controlled by a building ordinance and permits must be approved by James E. Zachary, field engineer at Charlestown for the Indiana State Defense Council.

At first each trailer camp had an individual septic tank, but now connections are being made to the town's sewage disposal system, which consists of Imhoff tanks designed for 2,500 people and sludge beds for 1,300. Enlargement of parts of the old system and construction of a second plant north of the town are seen as early necessities.

Charlestown has never had town-sponsored garbage collection facilities. Now arrangements must be made for such a service and negotiations are under way with a private firm to collect both garbage and trash by weekly pickups at private homes and daily calls at restaurants and similar establishments.

Extension of numerous water mains and construction of another 75,000-gal. elevated tank will be necessary. Water is obtained from the Ohio River a few miles away and is treated in a filtration plant built in 1938.

A few of the 753 trailers in 21 licensed camps at Charlestown, Ind.

Another serious problem is lack of room in the town's only public school building. The existing structure was designed for 600 students, but, with a present enrollment of 800, a new structure or an addition to the present building must soon be built.

No extra street work is seen necessary other than improvements being handled by a WPA program now under way. New roads will be constructed with a 2-in. bituminous top and concrete curbs, gutters and sidewalks. This will permit economical and convenient paving later with a thicker slab if needed. No extra street-paving tax is anticipated.

That the Charlestown development has placed an unusual load on state and federal bodies is revealed by the fact that a representative of the Federal Security Agency works at Charlestown three days a week, one Indiana State Board of Health employee spends practically all of his time at Charlestown, another board of health worker spends three days of each week there, and Mr. Zachary is there all the time. Likewise the Indiana State Police established a sub-office near the powder plant project and six full-time employees have been required to control traffic in the vicinity of the powder plant—*A.N.C.*

Floodproof Vault For Insurance Building

In the new Boston office of the New England Mutual Life Insurance Co., what is believed to be the first all-welded, floodproof safe deposit vault has been constructed. Extending through two basement levels, the vault is 46 ft. long, 18 ft. wide, and 25 ft. high. It is surrounded by 4- to 7-ft.-thick reinforced-concrete walls, which form part of the building's foundation.

Within these outer walls is a 200-ton steel lining electrically welded four times at all joints. To withstand exterior water pressures the lining, which has an arched ceiling, is reinforced throughout by 12-in. I-beams.

For each of the vault's two stories there is a 4x11-ft., 24-ton door, which provides a final steel-on-steel seal polished to tolerance of less than 0.0005 in. for its full 20-in. thickness.

Designed by Walter R. Whiting, the vault was built by Diebold Safe & Lock Co., and installed under the supervision of the Turner Construction Co., general contractors.

Removing Reservoir Silt By Sluicing Operations

UPPER SAN FERNANDO RESERVOIR has a drainage area of 5,430 acres, of which 80 percent is covered by brush growth and the remainder is under cultivation. The formation includes conglomerate, sandstone and shales. After about 20 years of service, the reservoir's original capacity of 1,977 acre-ft. was found to have been reduced by silt to about 1,500 acre-ft., a 24-percent decrease. Particularly heavy deposition occurred during the flood of March, 1938, when there was a discharge over the dam spillway of about 1,000 sec. ft. Estimated turbidity of the water at that time was more than 500 ppm. After this storm, soundings indicated depositions totaled 20 ft. in depth around the intake tower and over most of the lower portions of the reservoir. After unwatering it was found that the surface of this silt had a more-or-less uniform slope, over the entire reservoir floor, of 0.6 percent.

In planning sluicing operations, an 8-in. pipe was installed (1,100 ft. was required) to bring a high pressure water supply to the hose nozzles. Hose diameters of 2½ and 4 in. were used for sluicing and nozzles were ¾ in. to 1½ in. Pressures ranged from 75 to 120 lb. per sq. in., depending upon the number of nozzles used. Three men were required to handle the large nozzles and two on the smaller ones.

The top 5 ft. of the deposit in the reservoir was found to be very soft; it would assume an angle of repose of about 10 deg. when channels were cut through it. The bottom 15 ft., a very dense clayey material, would stand in a vertical face without disintegrating.

To provide adequate carrying water for desilting operations, a flow of about 10 sec.-ft. was run through the reservoir from the upper end. This flow created a meandering channel through the debris and removed a considerable portion of the silt without the aid of sluicing. However, the sluicing made it possible to move material from locations where special clearance was required, as at the base of the outlet tower, and materially increased the percentage of solids carried by the streamflow.

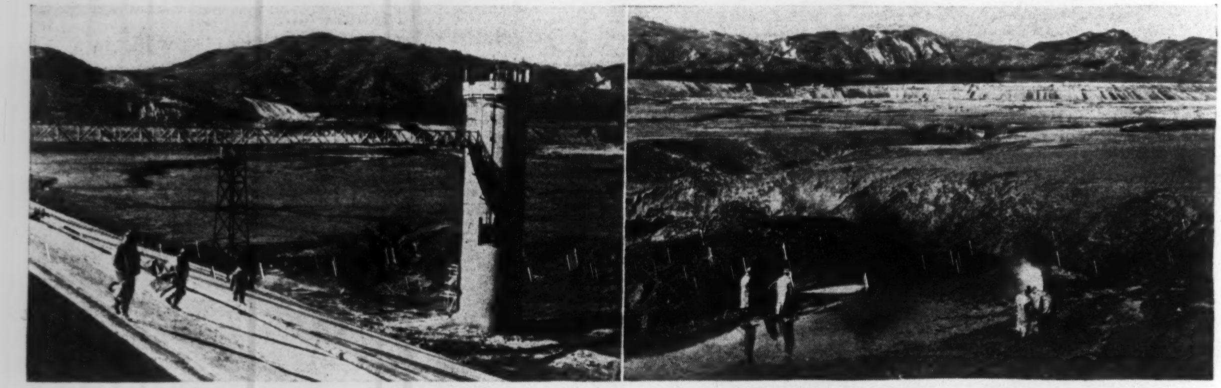
The reservoir was kept unwatered for 38 days and during this time, an estimated total of 20,000 cu. yd. of sediment was removed with the expenditure of 220 man-days or an average of 90 cu. yd. per man-day. This average figure is rather high by reason of the amount of debris removed by the stream flowing through the reservoir bed. The actual sluicing is not considered to have netted more than about 50 cu. yd. per man-day.

The logical place for disposal of this debris was at the extreme upper end of Lower San Fernando Reservoir, which is near the base of Upper San Fernando Dam. To retain the material in this location, a dam was built as an earthfill 450 ft. long containing some 17,000 cu. yd. This dam created a reservoir or debris basin with a capacity of about 20,000 cu. yd. Sluicing operations were stopped when this basin was filled. The debris was transported through the outlet works (600 ft. of 62-in. concrete pipe with a grade of 1 percent) and discharged through blowoff gates of 12-in., 24-in. and 30-in diameters. The slope of the material deposited in the debris basin was about 1 percent. Small overflow pipes were installed in the earth dam to allow water to escape from the debris basin into Lower San Fernando Reservoir. Although this water was quite muddy, it did not appreciably increase the turbidity of the storage in the lower reservoir.

Actual cost of the sluicing operations was nominal in view of the fact that no water was wasted—water used in the sluicing being added to the lower San Fernando Storage. Observation of the effective movement of the soft material by a small stream meandering across the unwatered reservoir bottom suggests that large quantities of silt could be removed in this way with a minimum of labor, using actual sluicing only for creating new pilot channels and to change the location of meandering streams.

To prevent entry of stormwaters heavily laden with debris into the reservoirs, a large storm channel has been built around both upper and lower San Fernando reservoirs thus isolating these storage basins from the flood drainage system.

The work described was done with crews of the Los Angeles Bureau of Waterworks and Supply, H. A. Van Norman, chief engineer and general manager.



The outlet tower with debris removed from its base. At right is shown typical sluicing operations. Note extent of channels cut through soft material by carrying water. Background indicates nature of watershed.

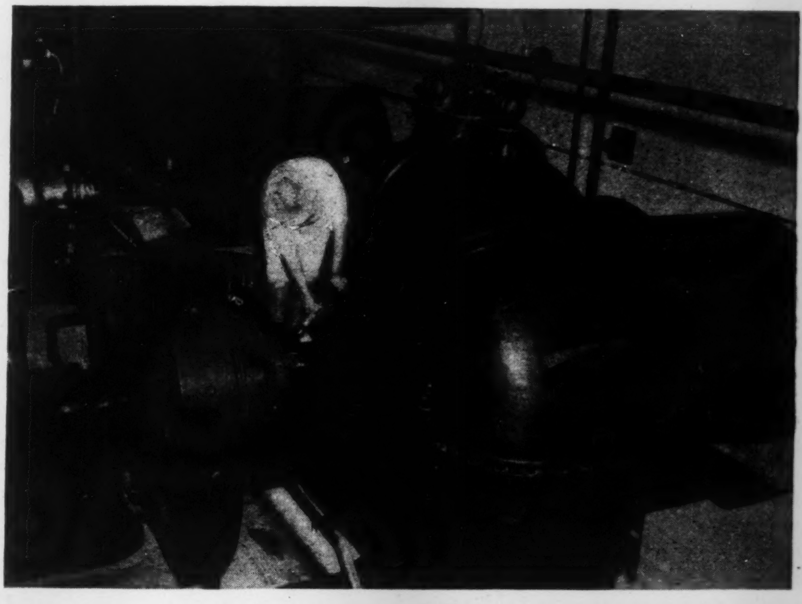
Pumping Plants for Irrigation System

***Contents in Brief**—Irrigation of the fertile Rio Grande Valley in Texas depends entirely upon pumping from the river. Willacy County Water Control and Improvement District No. 1, one of the largest irrigation districts in the valley, has recently put in service a series of new pumping plants. At the river are four 48-in. diesel-driven pumps. The main re-lift plant contains three 42-in. diesel pumps. Smaller re-lift plants and portable pumping units complete the water-handling system.*

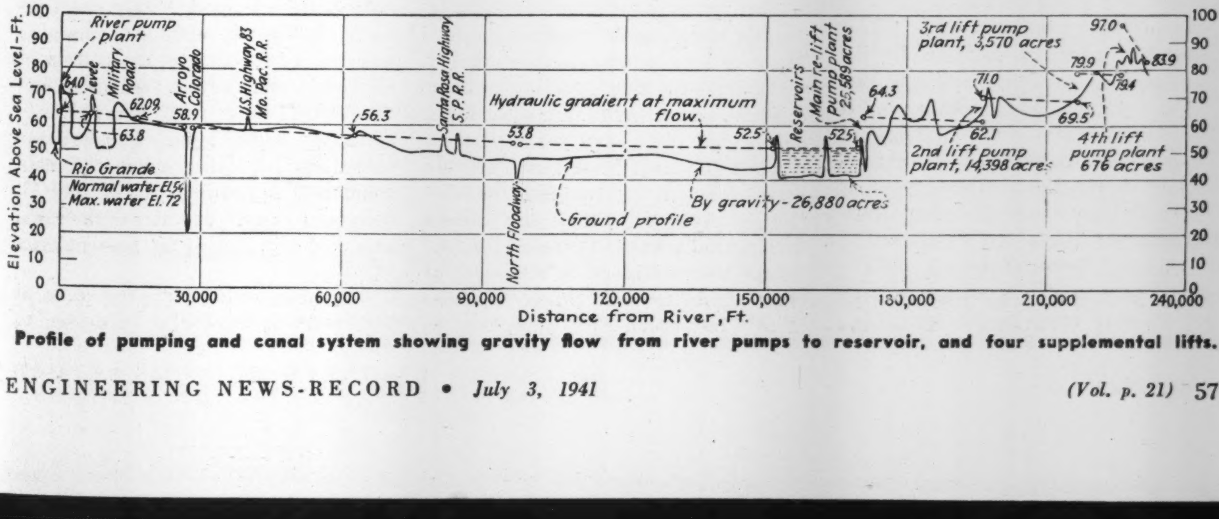
THE LARGEST AREA of land in the world irrigated by pumped water is the Rio Grande Valley of southern Texas. The newest and largest of the 15 organized irrigation districts in the valley is the Willacy County Water Control and Improvement District No. 1. This district includes 129,000 acres of land in the northeastern part of the valley, lying 18 to 32 miles from the river at an elevation of 25 to 75 ft. By last fall 72,000 acres of this area were under irrigation. The heart of this large irrigation system, which is financed by a PWA grant of $4,830,000 is a series of diesel-powered pumping plants.

All irrigation water for the entire valley is pumped from the Rio Grande. At the site of the Willacy County W.C. & I.D. No. 1 main pumping plant on the north bank near the town of Santa Maria, the normal river stage is El. 54; maximum is El. 72. Here the water is lifted to El. 64 and delivered to the main canal, completed in 1939. From the river to the south boundary of the district, 18.4 miles, the canal has a capacity of 600 cfs. The canal crosses Arroyo Colorado and the North Floodway (drainage canal for the valley) in concrete siphons 11 ft. in diameter. As the canal is unlined, it will leak considerably until it silts up. Ditches on either side of the canal carry seepage water to main drainage courses. The river pump plant and the canal can supply water for irrigating 128,000 acres, but present distribution works serve only 72,000 acres.

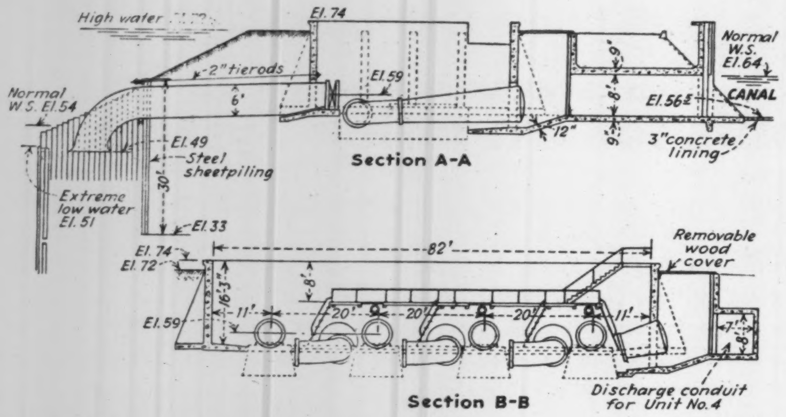
To assure irrigation water in periods of low river flow, a reservoir of 25,000-acre-ft. capacity was built near the center of the district. This reservoir adds another advantage to the system, that of prompt water service independent of the supply being pumped from the river. This allows the river pumping plant to operate conveniently and economically with-

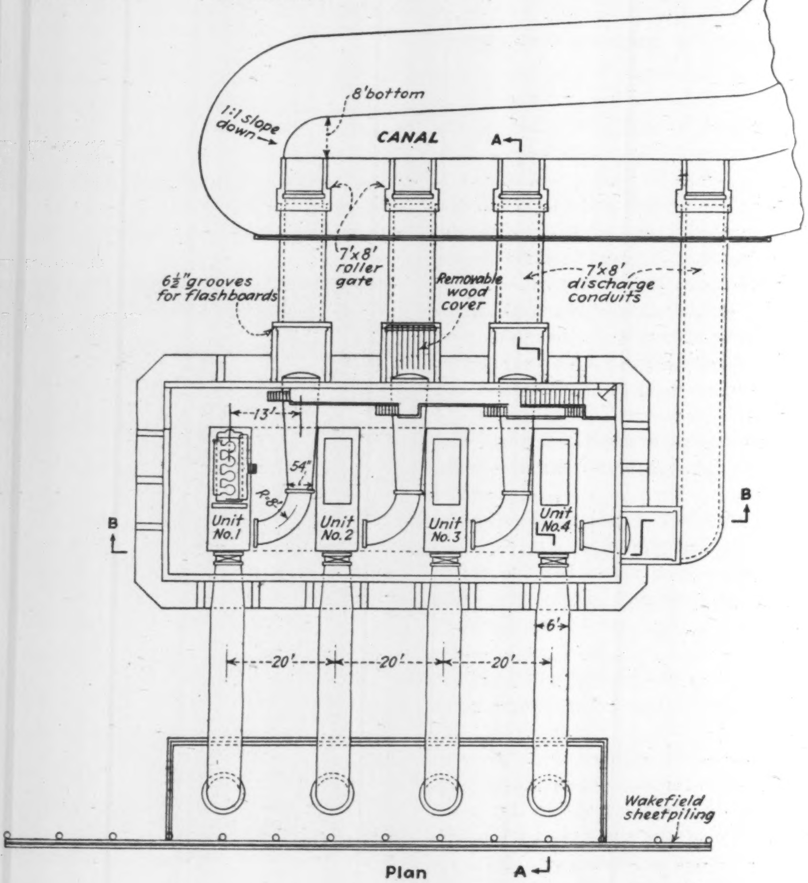


Four 48-in. diesel-driven pumps at main pumping plant lift 600 cfs. from river to canal for gravity flow to a 25,000-acre-ft. reservoir.



Profile of pumping and canal system showing gravity flow from river pumps to reservoir, and four supplemental lifts.


High water
El. 74
Normal W.S. El. 64
2" tierods
El. 59
Normal W.S. El. 54
6'
El. 56½
CANAL
12"
9'
8'
9"
3" concrete lining
El. 49
Steel sheetpiling
Section A-A
30'
Extreme low water El. 51
El. 33
El. 74
El. 72
82'
Removable wood cover
8'
16'3"
11'
20'
20'
20'
11'
7'
8'
El. 59
Discharge conduit for Unit No. 4
Section B-B


8' bottom
1:1 slope down
CANAL
A
7'x8' roller gate
6½" grooves for flashboards
Removable wood cover
7'x8' discharge conduits
13'
54"
R-8'
B
Unit No. 1
Unit No. 2
Unit No. 3
Unit No. 4
B
6'
20'
20'
20'
Wakefield sheetpiling
Plan
A

Plan of river pumping plant and sections showing arrangement of the four 48-in. propeller-volute type of units. Each pump is direct-connected to a diesel engine. Normal capacity of the plant is 600 cfs. against a pumping head of 10 ft.

Part of the land is irrigated by sprinklers fed by portable pumps shown on the opposite page.

out the necessity of a complicated coordination of pump operation with the actual use of water by the farmers. Leakage from the reservoir is taken care of by drainage channels similar to those bordering the main canal. The part of the main canal inside the district, from the south line of the reservoir, was built 11 years ago to carry a flow of 3,000 cfs. It now serves as an arm of the reservoir as well as a supply canal.

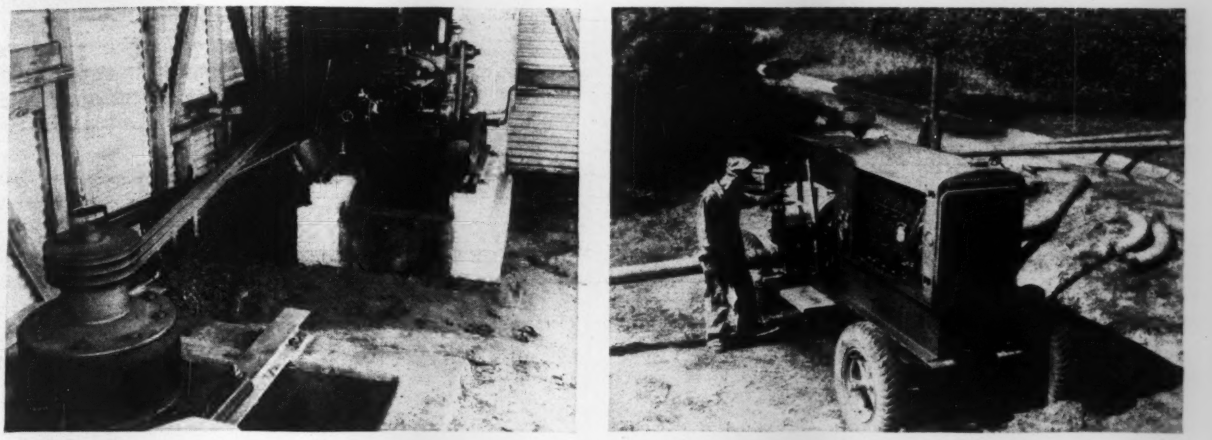
From the reservoir (El. 52.5) water is pumped to El. 64.3 by the main re-lift plant into a series of distribution canals. Three smaller re-lift plants work against pumping heads of 8.5 ft., 10.4 ft., and 17.6 ft., respectively. A profile of the system is shown in the accompanying illustration.

Pump plants

The main pumping plant on the Rio Grande, 110 miles above the mouth, contains four pumping units, each consisting of a 48-in. propeller-volute pump connected through a flexible coupling to a diesel engine. These volute pumps were designed specifically for this installation. The difficulty of maintaining a solid foundation for the heavy machinery so close to the river bank ruled out the usual practice of running the discharge pipes off below the diesels driving the pumps. Therefore, volute pumps were designed to discharge at right angles to their intake. Because of this restriction each pump had to be tailor-made for the particular job.

The river plant is operating with noteworthy efficiency. Its normal capacity is 600 cfs. against a pumping head of 10 ft. Performance tests of all four units show a fuel consumption of 0.71 lb. of fuel oil per acre-ft. of water lifted 1 ft. The average operating lift from river to main canal is 8 ft., so 5.68 lb. of fuel oil delivers 1 acre-ft. of water to the canal at a cost of 5.25c. at the present price of oil.

The main re-lift pumping plant at the reservoir is similar in design to



Smaller units serve the distribution network. Left: typical re-lift pump plant; at right, portable unit for sprinkling.

the river pumping plant. It is now equipped with three 42-in. propeller-volute pumps connected to 225-hp. diesels, with provision for the installation of a fourth unit. The normal capacity of the three-unit plant is 250 cfs. against a lift of 14 ft., but with the installation of the fourth unit the plant capacity will be increased to 333 cfs.

Re-lift pumps

Distribution canals are served by small re-lift plants set in rectangular concrete pits with open sides protected by bar screens, facing the feeder canal. These re-lift units consist of vertical propeller pumps driven through quarter-twist V-belts by vertical multi-cylinder gasoline engines. The capacities of the pumps vary from 2 to 15 cfs. against lifts of 6 to 20 ft.

Watering of the land is carried out by two irrigation processes. Over most of the area, of course, is a permanent distribution system of main and subordinate irrigation ditches and trenches. This area is irrigated by flooding at regular intervals as the particular crops under cultivation require. The remaining and smaller portion of the land is watered by a sprinkling system of pipelines. Water is pumped through these line by portable pumping units, consisting of a centrifugal pump and power unit mounted on truck chassis. This land, formerly sub-marginal and unproductive, is fast becoming fertile under irrigation.

Organization

Development of the Willacy County Water Control and Irrigation District No. 1 is under the direction of chief engineer W. E. Anderson. Fairbanks, Morse & Co., Chicago, Ill., which furnished all the pumping equipment as well as the diesel engine driving units for the District, supplied the information for this article.

New Military Maps for the Army

Military Maps that will supply the specific details essential to efficient army action are now being prepared with all possible speed by the Corps of Engineers with the assistance of the Work Projects Administration. Terrain and tactical maps of some of the most important coastal and industrial areas, and maneuver maps for Army use this summer are included.

More than 30 mapping projects, covering an area aggregating some 200,000 sq. mi., are now operating and additional projects are scheduled for early operation. Among the important areas now being mapped for military purposes are the Eastern Seaboard, the Great Lakes states, portions of the West Coast and the southern states. Special city and industrial areas include New York, Philadelphia, Pittsburgh, Rochester, Cleveland and Cincinnati.

With only a small part of the country adequately mapped for military purposes, according to the War Department, it is of major importance that up-to-date maps, which give the contours of the land, the location of roads, bridges, railroads, and other structures, be provided at once. Adequate defense, the disposition of troops, artillery fire, questions of supply, and related military problems, depend for satisfactory solution upon accurately detailed maps.

For this reason these projects have been certified by the Secretary of War as essential to national defense, and the War Department is using the funds, man-power, and mapping and surveying experience of the WPA to bring up to date all maps of strategic areas as quickly as possible. Projects now operating represent an approximate outlay of $3,000,000 in WPA funds, plus approximately $700,000 provided by the Army as official sponsor. At the present time approximately 1,000 cartographers, draftsmen, clerks, and surveyors from WPA roles are employed in this work.

The majority of the maps being prepared are classified as tactical, or topographic, and will show natural and artificial detail on a scale of approximately one inch to the mile.

Special terrain maps with a scale of 1:20,000 are being worked up for a few cities, including the New York area. The maneuver maps are prepared on a scale of 1:125,000 and are being worked up for areas where the Army will hold summer maneuvers.

Two other important jobs are closely tied in with the mapping projects. One is the conversion to the military grid system of the coordinate positions established by previously completed surveys of the U. S. Coast and Geodetic Survey and the WPA. The other is the operation of special WPA surveys, including those required for harbor defense, utility and structure surveys on military and naval posts, and surveys of highways.

Steel Floor Slab Forms, Produce "Architectural" Ceiling

***Contents in Brief**—A steel pan form for concrete floor slab construction, designed for an unsupported 10-ft. span, lays without tools or ties, and leaves a continuous small burr, which the architects like, to give a plank effect to the exposed concrete of the room ceiling.*

DESIGNED for construction economy, but desirable for its "plank ceiling" effect in subsidized housing, a removable pan-type steel form for concrete floor slab work is in use at the Bellevue Square housing development in Hartford, Conn. The pans are made 12 in. wide and in "standard" 10-ft. lengths with a few specials as required for diagonals, corners, etc. Special beam sides permit variable depths of the supporting beams and the 10-ft. span length eliminates nearly two-thirds of the conventional shoring.

The housing development

The forms are being used on a 345-dwelling development of the Housing Authority of the City of Hartford located a few blocks north of the principal business district in an area where, according to a WPA survey, more than 80 percent of the residential structures were in need of major repairs or unfit for habitation. This development is the third constructed under sponsorship of the city and USHA, the first two having 146 and 242 dwelling units respectively and another, of 1,000 units, being now under contract.

At present housing conditions are serious in Hartford and the surrounding territory. As a result, it has been impossible to evacuate the ramshackle, substandard apartments now occupying the site because new living quarters cannot be found for the tenants, mostly colored, now living there. About half the site has been made available to the contractor and it now appears that it will be necessary to complete the buildings on this area and move the families into them before construction can proceed.

The 345 dwelling units are in 14 buildings, three and four stories high. They are of brick construction with concrete floors, which will be left exposed in the hallways but surfaced with asphalt tile in the living quarters. In addition to the 14 dwelling buildings an administration building and a central steam plant are on the site. The steam plant will provide heat and hot water for the entire area and will serve as distribution and meter center for all buildings in the development.

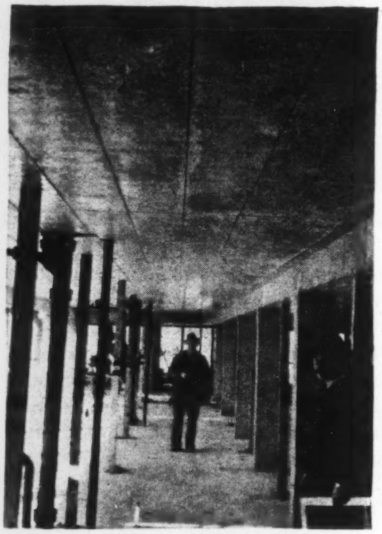


Fig. 2. Plank ceiling effect is left permanently in the exposed concrete by the rolled edge of the pan form.

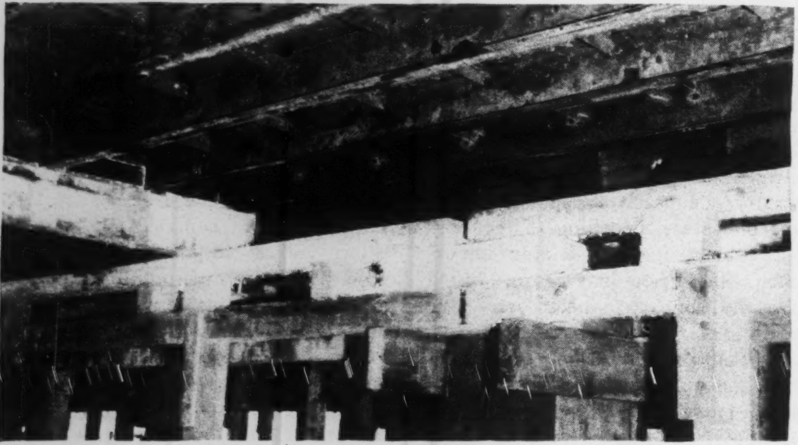


Fig. 1. Steel pan forms of 14-gage metal span 10 ft. for floor slab of low-cost housing. The transverse timber has a pressed steel spacer spiked to its top to keep the pans tight together.

Concrete frames

The buildings are complete concrete frames which rest on spread footings designed for 1 ton or 2 tons per sq.ft. as the material appeared to warrant. Only four of the structures have basements though all have utility piping under the first floor. All buildings have concrete walls from the first floor level to well below the finished ground line. Forms for these walls are of plywood held by so-called snap-ties. Part of the forms for the first floor slab was also of plywood as satisfactory second-hand material was available for surfaces not to be exposed and this reduced the number of steel forms it was necessary to buy to maintain the schedule.

The columns are same size for all floors. The plywood column forms are held in alignment by diagonal rods, with turnbuckles, to eyebolts in the previously placed concrete while special wedge clamps, made to accommodate only the one size column, are used as ties. The clamps are welded at right angles at one corner using the conventional one bar in one direction and two the other way. Wedges pull the box tight against accurately made sides.

Beam supports then go into position along each side of the columns and are supported by 3 x 4-in. shores. The beam bottoms are 28-gage sheet metal fastened by screws to 2-in. nominal thickness lumber.

Steel pan forms

Underneath details of the steel pan forms and supports are shown in Figs. 1 and 4. The pan is 12 in. wide made of 14-gage black metal pressed into a U. Welded in angle-struts at 12-in. centers strengthen the form against local failure, and the $4\frac{3}{4}$-in.-deep side flanges form a 10-ft. long beam to carry the load of a $5\frac{1}{2}$-in. thick slab, plus the concentrated live load of workmen during concrete placing. The pans are supported at their ends by a 4x6 timber carried on the beam supports. A pressed steel spacer with an upturned edge at each side, cut to accommodate the flanges of the pans, is spiked to the top of the 4x6, correctly aligning the pans and holding the edges tight together. The pans have a butt joint over the 4x6 beam. Special forms are provided for short lengths and certain diagonals necessary at stair wells at the connections to Y wings on the building ends.

Form handling

The forms are moved entirely by hand. They are loosened by knocking out the wedges under the supporting timber and can then be removed and handled individually Reshoring, to facilitate early stripping, can be set under any pan without interference as there is no connection between pans except the spacer on the 4x6 support. The standard 10-ft. length of panel weighs 65 lb. and is easily handled by one man for carrying and placing. For reuse the pans are handed up through stair wells and distributed as required on the floor above.

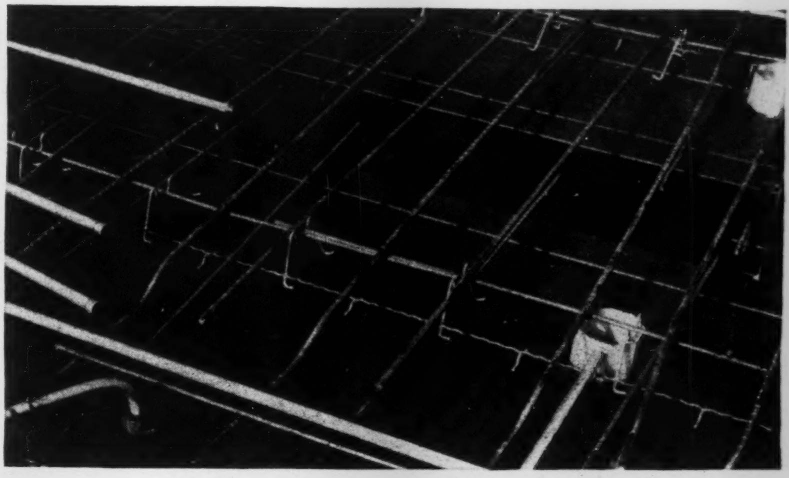


Fig. 3. Minute holes drilled through the pan forms permit sheet metal screws to hold inserts. The forms pull off easily and the holes, if not reused, plug themselves. Note that the low and high chairs for reinforcement are welded to the same wire that makes a spacer for all of the reinforcing rods.

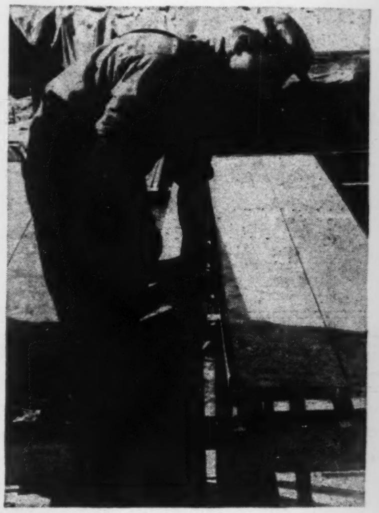


Fig. 4. The beam bottom is separately supported, permitting the beam depth to be varied. Note ease of handling sections into place.

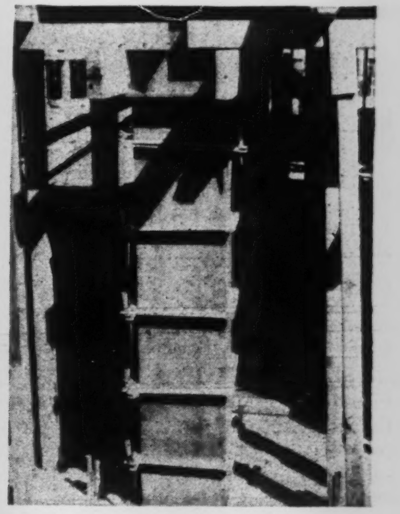


Fig. 5. Column forms have clamps welded at a right angle and wedged at opposite corners. This "squares" the plywood form with little labor.

Electrical outlets, receptacles and other ceiling inserts are fastened to the steel form by boring through it with a small bit and breast drill then using sheet metal screws for the fastenings. The light gage metal drills easily and the screws can be quickly placed by one man working on the prepared floor. The screws pull out readily when the pan is stripped and the holes are so small that they fill with concrete at the next use. However, most of the time the panels are re-used in the same position with the inserts fastened through the same holes. Small pipe openings are made with tin sleeves fastened to the steel pans and larger permanent openings for sanitary plumbing are boxed out with wood frames also set on top of the form.

Reinforcing steel for the beams is partially prefabricated, a basket for the bottom of the beams coming to the job with stirrups welded on. Column steel is tied at a bench on the ground, hoisted to the floor, then dropped into its proper position.

Concrete handling

Concrete is purchased, delivered to the work in transit-mix trucks, from a commercial concrete plant. It is placed in the buildings by a large-capacity, long-boom, crawler crane and a two-yard concrete bucket that is laid down to fill from the conventional height truck mixer. The bucket is a single-line type with hand-operated discharge gate. However, a "drag

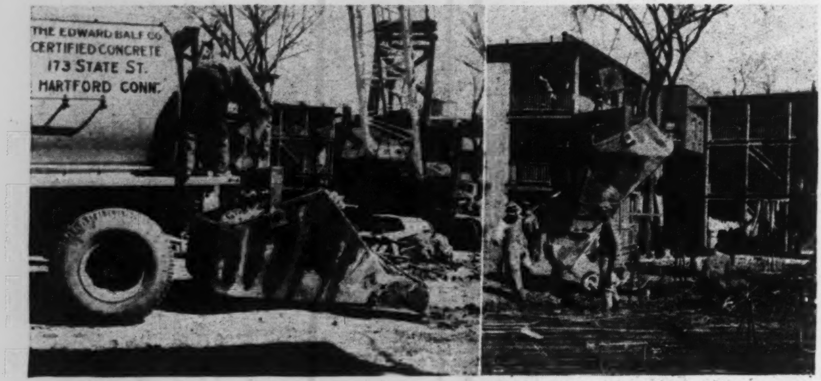


Fig. 6. Two-yard concrete bucket designed to load under truck-mounted mixer.

line" is used to spot the bucket for filling and dumping to reduce the amount of "booming" necessary. The "drag line" is run through a snatch-block fastened part way up the boom to prevent its fouling on reinforcing steel and other fixed objects.

Flexible-shaft, gasoline-driven vibrators are used to consolidate the concrete, special care being used to keep the point of the vibrator head off the forms.

The concrete is leveled with a 30-ft.-long manually handled strike-off, which is made of aluminum in the shape of a box girder. Top and bottom of the girder are 6-in.-wide channels and sides are aluminum plate (12-in. high at center and 6 in. at either end) screwed to the flanges of the channels.

A pipe rail on top of the strike-off provides an easy hand-hold and a connection for horizontal pull permits several men to handle the screed. Straightedges are used to check the surface, which is finally finished with steel trowels.

The under side of the concrete floor and beams are left permanently exposed as the ceiling of the rooms below. The small radius, about $\frac{1}{8}$ in., along the longitudinal edges of the individual pan, leaves a small fin which gives the appearance of a plank ceiling, Fig. 2, and provides a pleasing "architectural treatment" for the concrete.

Plumbing and heating installations are following closely behind the concrete construction. Brick work is scheduled to start shortly using conventional construction methods and designs.

Organization

The Bellevue Square housing development of 345 dwelling units is being built under a $1,201,813 contract by the Wm. L. Crow Construction Co. of New York City, for whom J. W. Wallace is superintendent. A 140-unit extension to the development is now contemplated with a request for bids expected shortly. Ebbets & Frid of Hartford are architects on both sections. R. V. Bonadies is chief inspector for the City of Hartford Housing Authority.

All the concrete work is being done by the Wilcox Construction Co. of Long Island City, New York, who devised the forms and had them built to order. V. A. Thurston is superintendent for Willcox on this work.

Bricks and Walls Tested by Bureau of Standards

MOISTURE CONDENSATION in walls and the resistance of building bricks to frost action are the subjects of two recent reports issued by the National Bureau of Standards in its series of studies on buildings and building materials. Copies of the reports, noted below, may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C.

Two Reports

Condensation in Walls—Factors which control humidity in the insulated walls of dwellings include the structural materials, construction details, and the moisture conditions within and without the building. If these factors are known, the probability of condensation in the walls can be estimated. Causes of such condensation, tests of materials in relation to it and methods of preventing it in both new and old buildings, are discussed in report No. B.M.S. 63 (price 10c.). Three remedies are noted: (1) lowering the indoor relative humidity; (2) increasing the vapor resistance on the warm side of the insulation; (3) lowering the vapor resistance on the cold side of the insulation.

As to the first method, with single-glazed windows the mean relative humidity is likely to be so low that condensation will not occur, but it may occur with double-glazed windows or storm windows. For the second method, the addition of a vapor barrier on the warm side is effective. Lowering the vapor resistance on the cold side of the insulation, for the third method, may be effected by providing adequate ventilation from the interior of the wall to the outside, or by the use of sheathing paper of low vapor resistance. The report states that some insulating materials of flexible blanket and rigid board types have self-contained vapor barriers. The general conclusion is that while the data on moisture permeability are insufficient to permit more than a very rough estimate on condensation within insulated walls, it is possible to calculate the degree of permeability of interior and exterior parts of the wall necessary to prevent condensation.

Frost Resistance of Bricks—Tests of some 4,500 bricks of various grades, produced by 229 manufacturers in various parts of the country, are recorded in report No. B.M.S. 60 (price 15c.). These are laboratory tests on the resistance of building brick to freezing and thawing, and the methods of testing are described. There is no general review, the report consisting mainly of tabulated results of different grades of brick classified as to 25 geographical districts, thus indicating the durability and other properties of brick made within the several districts. In general, results are shown for modulus of rupture, compressive strength, water absorption, saturation coefficient and loss of weight for all specimens tested.

Marking Highway Lanes With Stone Chips

***Contents in Brief**—Stripes of contrasting stone chips are being used in experiments in lane marking on highways in Texas and South Dakota. The stripes can be applied at low cost and show up well under natural and artificial light in all kinds of weather.*

EXPERIMENTS in improving the visibility and durability of lane markings by rolling stone chips of a contrasting color into a binder are being carried on in Texas and South Dakota with encouraging results. Costs of application are not much higher than for painted stripes, wearing qualities are expected to be much better, and visibility under all conditions is high. Also, because the chips cover the binder, traffic can run over the fresh stripe without injury to the surface as is the case with fresh paint.

Lane marking in Texas

The center stripe being applied by the Texas Highway Department consists of a ¼-in. thickness of crushed stone rolled into an asphalt primer coat. Stone of a color in contrast to that of the pavement is used; dark stone is put on concrete or gray asphalt, light-colored chips on black bituminous surfaces.

The new lane marker costs about $14 a mile for materials and application, compared with a minimum of $15 for the usual painted stripe that must be renewed every few months. On asphalt surfaces the added stripe will last as long as the pavement; on concrete highways it is expected to last for several years.

Test stripes also are being tried out on the highways in various sections of the state, with yellow, white and other colored paint sprayed onto and between the small rocks in the new stripe. It has already been shown that the paint will wear much longer on the new type stripe. Also under study is coloring the white stone with chemicals before it is placed in the stripe.

Since the built-up thickness of the new type stripe raises it slightly above the pavement surface, the marker can be seen when the light is so intense that the sense of color is impaired. This is notably true when headlight glare is encountered on a wet pavement at night. The stripe protrudes above the film of water on the pavement and is highly visible. As the surface texture of the stripe is made to contrast with that of the road, this also contributes in an equally important way to visibility under extreme conditions of glare. Highway department engineers state that because of its greater visibility and also since it can be felt slightly when the front tires touch it, the new stripe does a much better job of keeping traffic separated and on the right side of the road and therefore should reduce the number of collisions.

Another advantage of the new stripe is that cars may run over it almost as soon as it is put down. No small warning flags need to be placed along the stripe to keep traffic off from it, with the exception of locations on sharp curves or turns where traffic is especially heavy. Even then only a few hours are needed until the asphalt has hardened sufficiently to hold the small stone in place.

Application

George B. Finley, district engineer of District 16 of the state highway department, Corpus Christi, has striped most of the highways in his district with equipment designed and built in the district shop. The equipment includes a small four-wheeled chassis carrying a large tank and pump for spraying the asphalt primer, a regular highway department maintenance dump truck carrying the stone chips, a spreader and a roller to press the stone into the primer. The truck pushes the primer applicator ahead of it, and the stone chips flow from a chute at the rear of the truck dump body into a spreader immediately in front of the roller, which is pulled by the truck. This outfit operates at the rate of 4 mph.

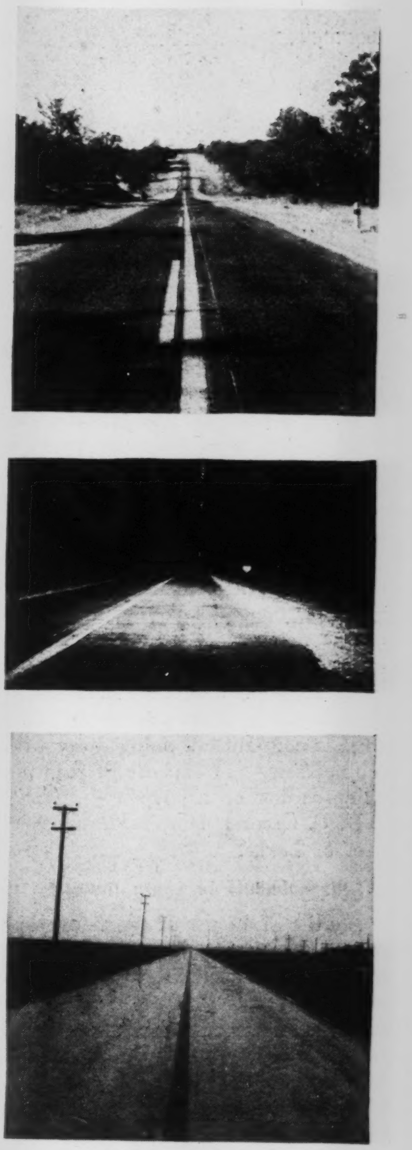


Fig. 1. The new marking on Texas roads is highly visible under daylight, night or rainy-day conditions.

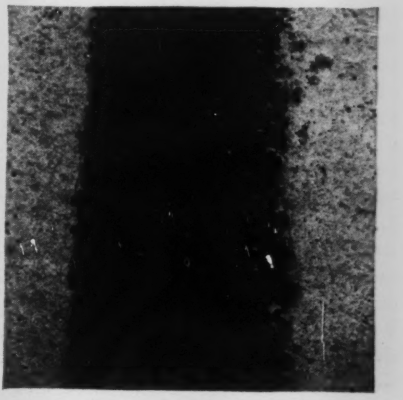


Fig. 2. Black chips applied to a light-colored surface.

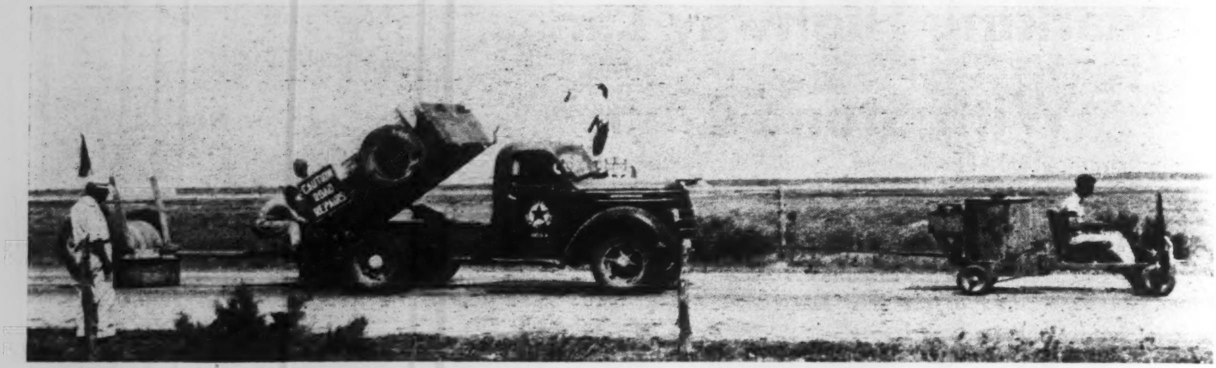


Fig. 3. Outfit for applying raised center stripe on Texas highways. A maintenance truck, loaded with stone chips, pushes a primer applicator ahead, dumps the stone into a narrow spreader and pulls the roller that compacts the chips into a ribbon ¼ in. thick. The cutfit moves at about 4 mph. while applying the center stripe.

The Texas highway department has also devised a new permanent center stripe for concrete highways and a considerable amount has been built into new concrete paving. Engineers of the department developed a new idea of mixing a black or other colored pigment into the concrete at the center line of the pavements as the road is constructed, doing away with the necessity and expense of painting or spreading on a stripe.

D. C. Greer is state highway engineer of Texas.

Experiments in South Dakota

Studies of the use of quartzite chips embedded in asphalt as a means for improving the visibility of traffic lines were reported by L. D. Howard, safety engineer, South Dakota State Highway Commission, in the April, 1941, issue of *Traffic Engineering.* The following is abstracted from that article, supplemented by some additional information from Mr. Howard.

The first experiment was made north of Wolsey, S. D., on a bituminous treated base course. Clean and sharp quartzite chips, ⅜ to ⅛ in., were used with an RC-1 asphalt as the embedding material. Initial estimates of the quantities required were placed at 65 gal. of RC-1 per mile and 3,500 lb. of chips, but these were found to be too high, actual quantities being 40-50 gal. per mile and 3,000 to 3,200 lb. of chips. Several gradings of chips were tried, some with a fine material included under the ⅜-in. size, and some with ⅜- to ⅛-in. screened sand. Within a few hours it was easily shown conclusively that the chips should be ⅜-in. to ⅛-in. clean and sharp. Care had to be exercised to see that there was no excess of rapid curing asphalt, as that results in bleeding.

The applicator was designed in the highway commission's district office at Huron. It applies a strip of rapid-curing asphalt 4 in. wide and immediately follows with a controlled amount of chips which are embedded with a roller giving approximately 160 lb. pressure per in. of width. The asphalt was applied with a regular center-line stripping machine.

The first application was made on a section of pavement 14½ miles long, and the total cost amounted to $9.72 per mile. This included $13.43 as equipment rental, $48.90 for labor and truck drivers, $54.60 for chips, and $37.50 for oil, a total of $141.

Since the applications described in *Traffic Engineering* were made the applicator has been redesigned. It now is a one-process machine, shown in Fig. 4, which is pulled by the truck that supplies the chips.

Mr. Howard states that while the pink quartzite chips that were used are hydrophilic by nature, indicating that ordinary tar should be used with them, the tests demonstrated that a rapid-curing asphalt of the RC-3 or RC-4 specification is more desirable. This was proven in the curing. The tar seemed to soften under heat and continued to bleed through the chips, spoiling the contrast, whereas the RC-oils cure out to a harder asphalt.

E. W. Meeker is state highway engineer of South Dakota.

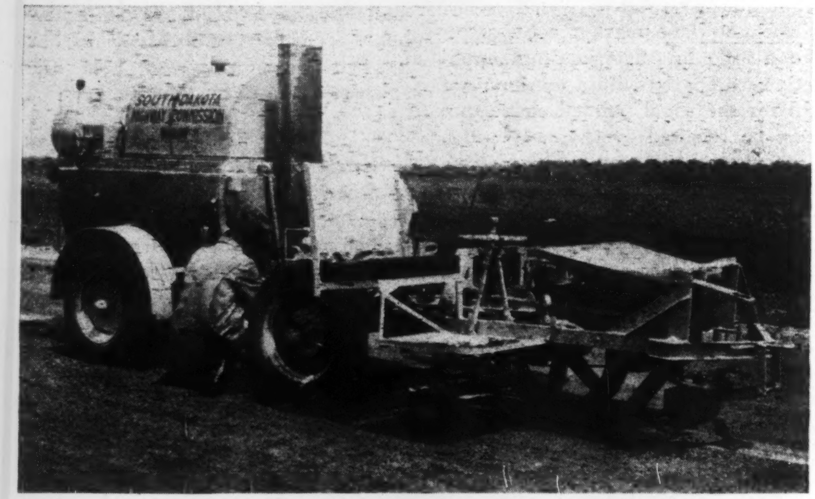


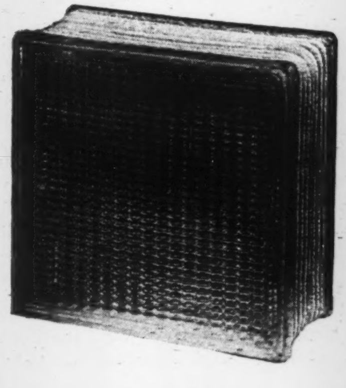
Fig. 4. The new South Dakota applicator combines three operations. Asphalt, heated in the tank at the rear, is applied by the stripper at the forward (right) end. Chips from the small hopper at the forward end are fed down a chute to guide plates just in advance of the roller. From his side seat the operator can see and control all operations. The applicator is hauled behind the truck carrying chips, which has a rear chute to feed chips directly into the hopper on the applicator.

Lighting Principles and Practice With Glass Block Panels

BUILDING DESIGNERS' LIBRARY

D. A. Bridges
Director of Research and Development
Owens-Illinois Glass Co., Muncie, Ind.

***Contents in Brief**—Day lighting of buildings with panels of glass block requires knowledge of their properties and methods of installation. Recent developments include light-directional blocks. Wall panels are erected with mortar joints using reinforcing of wire mesh. Expansion provided for with filler in chases at head and sides. Large panels require stiffeners or mullions.*



THE MATERIAL

Glass blocks are hollow units with 60 per cent of the air removed. They are 3⅞ in. thick and come in standard sizes of 6x6 in., 8x8 in., and 12x12 in. Laid up in panels, within certain limits, they are self-supporting. Corner and radial blocks are available in the 6 and 8 in. sizes. On the edges a grit-bearing bond material is baked on, insuring a proper joint of portland cement mortar. The block illustrated is one of the prismatic type.

EFFECTIVE USE of glass blocks for the day lighting of buildings requires both a knowledge of the characteristics of the material, particularly the recent advances in light-directing properties, and the methods of installing the panels in the walls of a structure. This type of information forms a definite part of the background for modern building design and it is reviewed here with specific reference to the data that are of most practical value to structural engineers.

The key to modern day lighting of buildings by glass block panels is the recent advance in the properties of the blocks themselves which now include light-directional characteristics classed as either: (1) prismatic, or (2) no-glare. In the former the light from the sun or sky is directed by prisms on the inside faces of the blocks from almost any altitude position to an angle slightly above the horizontal after passing through the glass block panel. In the other type of modern blocks, the outside light, regardless of the angle of the sun, is diffused with almost perfect distribution into the building. Blocks which are classed as general-purpose or decorative are not of direct interest to the engineering designer and are not discussed in this article.

Directional blocks

The prismatic block is designed to take sunlight from any altitude position and to refract it above the horizontal, upwards toward the ceiling (see diagram). This principle permits the prismatic block to throw light deep into a room and to show light readings at 20 ft. from the panel higher than those for ordinary windows. Although prismatic glass is not new, the glass block for the first time makes it possible to seal hermetically the prismatic surfaces so that they are free from dirt and the corrosive effects of the atmosphere.

Advantage of the no-glare block is its capacity to take light from wide angles and distribute it over the interior of a room with more uniformity than is possible with other blocks. Its effectiveness is due to an interior prism structure which spreads the light fanwise through an arc of almost 180 deg. (see diagram). This same construction causes it to cut down the light when it is normal to it and to pick it up when it is at wide angles and less bright, making for more uniform lighting throughout the day. Because of this spreading effect, the no-glare block can be looked at directly without discomfort; actually, it looks brighter from the sides than when viewed head on.

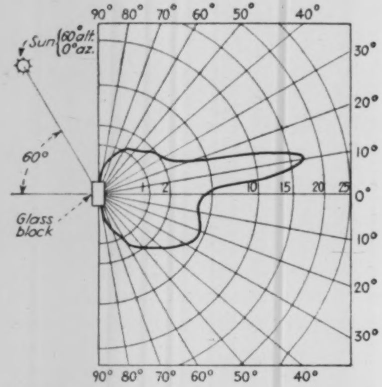
Generally, a glass block panel with south exposure will transmit only about 30 percent of the solar heat impinging on the exterior of the panel. This compares with 80 percent for ordinary glazing. In tests run with panels facing east and west, approximately the same total solar heat transmission was registered.

Care should be exercised in placing circular panels of glass blocks where they will be exposed to prolonged concentration of sunlight, as the heat radiated from a curved surface tends to be concentrated in the center of the arc.

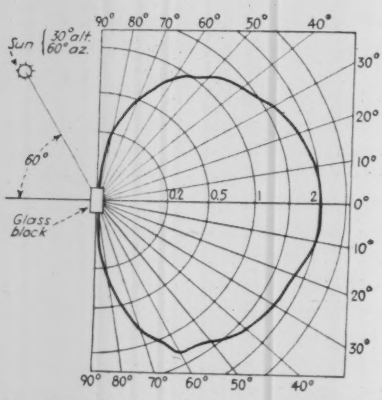
Where block is used on all sides of a building, a reasonable relationship should be maintained between the quantity used and the floor area. Where excessive amounts of block are employed on sun-exposed surfaces, some provision for shading should be made unless the no-glare blocks are used.

Heat and sound transfer

The over-all still-air transmission (air to air) of the average glass block ranges from .400 to .425, depending on the design of the block. With a wind of 15 mph. the transmission is from .482 to .486. These compare



Light-directional property of prismatic glass block, shown in side view, is indicated by high-altitude illumination from the sun being passed through a block and thrown into the building at an angle about 10 deg. above the horizontal.



No-glare block, shown in plan, takes light from the sun, even at oblique angles, and distributes it into the building in all directions.

favorably with several types of conventional wall construction; for example, an 8-in. brick wall, plastered, has a coefficient of .46 in still air. Tests show that there is practically no difference in the thermal insulation of blocks of various sizes. Consequently, the figure of .49 is recommended for panel use when computing heat loss for blocks of all sizes which have smooth exterior faces and 0.46 for blocks with ribbed exterior faces.

Due to the low conductivity of glass block panels, they are practically immune to condensation difficulties common to single glazing. With an inside air temperature of 70 deg. and relative humidity of 40 percent, an outside temperature of — 14 deg. with a 15-mph. wind, is required to produce condensation on glass block while with single glazing sash condensation will form at 33 deg. under the same conditions.

Sound transmission tests on glass blocks show an average sound reduction over a range of nine frequencies of 40.7 decibels. This compares favorably with other partition materials of good sound insulating qualities: 1½-in. plaster on metal lath (29.6 decibels); 4-in. clay tile, ½-in. plaster (36.3 decibels); 8-in. brick, 1-in. plaster (53.8 decibels).

A panel of glass blocks, tested at a materials testing laboratory, in 1938, proved to be entirely elastic under repeated loadings within a pressure of 40 lb. per sq.ft., which corresponds to a wind velocity of 115 mph. The tested panel was 7 ft. 3 in. wide, 8 ft. 8 in. high, erected with recommended wall ties and anchored at sides and top. Total failure occurred at 91-lb. pressure, corresponding to a wind pressure of 174 mph.

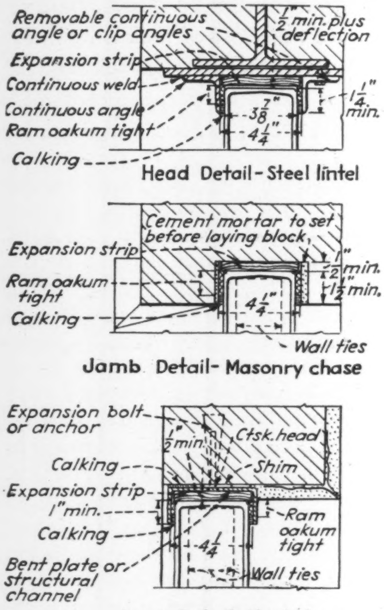
Glass blocks are listed in the Underwriters' Laboratories, Inc., Reexamination Service as retardant for use in window openings not exceeding 120 sq. ft. in area, or 12 ft. in width or height, subject to light fire exposure (Class F). In effect, this permits the use of glass block panels in openings were ordinary wire glass is used.

Constructing the panel

Mortar used for laying up glass blocks in panels should be composed of one part cement, one part lime, and 4 to 6 parts sand. The mixture should be drier than that used for ordinary brick. Consistency should be such that the hoe is clean when withdrawn from the mortar. (Integral waterproofing is sometimes mixed into the mortar.)

Horizontal mortar joints of glass block panels should be reinforced with galvanized wire mesh. These ties should run continuously by lapping the ends 6 in. and should be located in horizontal mortar joints as follows: (1) in panels composed of 6-in. sq. blocks: every fourth course; (2) in panels composed of 8-in. sq. blocks: every third course; (3) in panels composed of 12-in. sq. blocks: every course.

Mortar joints in glass block panels should be ¼ in. thick and completely filled with mortar. The block should not be hit with a metal tool, but laid by shoving (working into place with the hands). After the mortar has taken initial set, the exposed edges of

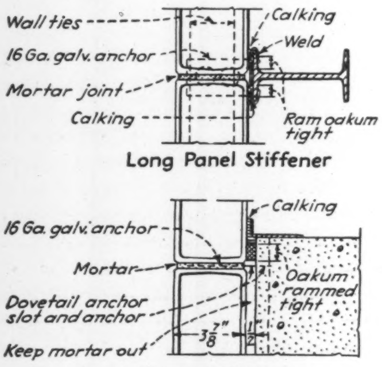

Removable continuous angle or clip angles
½" min. plus deflection
Expansion strip
Continuous weld
Continuous angle
Ram oakum tight
Calking
1¼" min.
3⅞"
4¼"
Cement mortar to set before laying block
Expansion strip
Ram oakum tight
Calking
½" min.
1½" min.
4¼"
Wall ties
Expansion bolt or anchor
½" min.
Ctsk. head
Calking
Shim
Expansion strip
1" min.
Calking
Bent plate or structural channel
4¼
Ram oakum tight
Wall ties

Head Detail - Steel lintel

Jamb Detail - Masonry chase

Jamb Detail - Steel chase

Methods of treating the head and jambs of glass block panels, showing the expansion joint provision and the caulking.


Wall ties
Calking
Weld
16 Ga. galv. anchor
Mortar joint
Calking
Ram oakum tight
Calking
16 Ga. galv. anchor
Mortar
Oakum rammed tight
Dovetail anchor slot and anchor
Keep mortar out
3⅞"
½"

Long Panel Stiffener

Tall Panel Stiffener

Large panels require special provisions for stiffening: Long panels are reinforced by vertical members (upper) and tall panels may be anchored to spandrel beams (lower) for securing the necessary support.

the joint should be tooled slightly concave and thoroughly compressed with a round jointer. The nature of the mortar, and the method used in laying up the blocks are most important in effecting a watertight construction, resistant to water, wind and stresses due to other causes.

Expansion provisions

All glass block panels require provision for expansion at the jambs and head. This may be accomplished in a number of ways. Most common, in masonry construction, is by means of 4¼-in.-wide chases built into the brickwork, wide enough to accommodate the thickness of a block with allowance for calking at each side, and about 1¾ in. deep (see drawing).

In masonry walls 8 in. thick or less, steel channels (see illustration) are recommended instead of chases. The channels are bolted onto the masonry at jambs and head so that the boltheads are flush and do not project into the channel. The channel should be about 1½ to 1¾ in. deep and approximately 4¼ in. wide, inside dimensions.

In both types of chases ½-in.-thick strips of mineral fibers are used for expansion. They are inserted in the chase or channel to absorb movement, stress or vibration between the wall and the glass block panels.

Stiffening of panels

Bracing, consisting of intermediate structural stiffeners, or mullions, or both, should be provided in the design as stiffening in large panels.

Panels of more than 144 sq. ft., but less than 250 sq. ft., and not more than 25 ft. in length, should be equipped with structural stiffeners. These may consist of light steel angles, or an I-beam designed for proper stiffness, installed behind the panel at the midpoint. The panel should be attached to the I-beam by means of approved galvanized anchors set in the mortar joints. Oakum and calking should be inserted between the I-beam and the panel to prevent contact between the metal and the glass.

Panels more than 25 ft. long and more than 250 sq. ft. in area, should be subdivided by mullions instead of stiffeners. H-type mullion sections (I-beams) should be set so that the panel sections fit into the chases formed by the flanges and web of the steel member, which are to be lined with expansion strips. This construction permits expansion and support against wind pressure.

Tall panels should be braced with intermediate stiffeners or spandrels, or subdivided by shelf angles. These should usually be placed at 10-ft. intervals, if the panel is more than 20 ft. in height, and more than 250 sq. ft. in area.

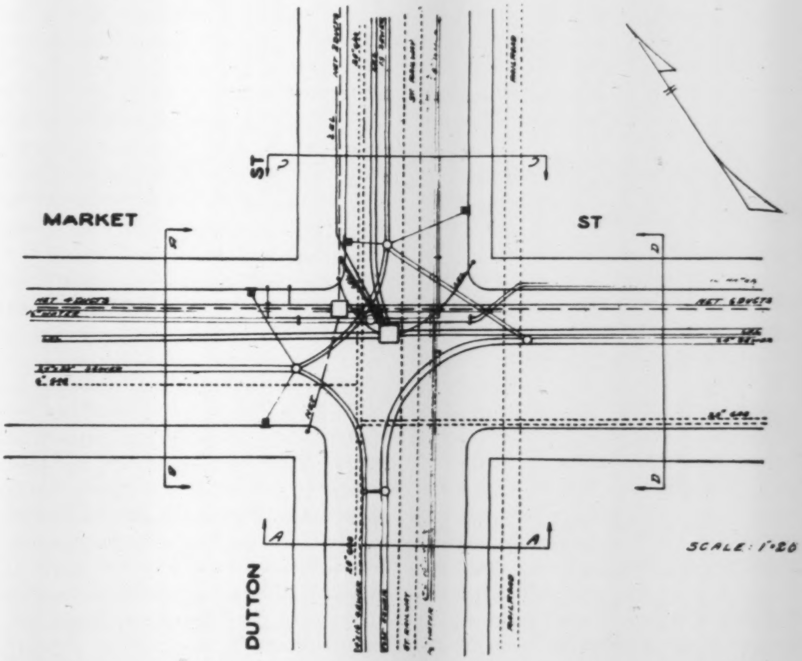
One or more isolated areas of glazed sash, not exceeding 15 sq. ft. in area, may be installed in a panel not exceeding 144 sq. ft. in area. The combined areas of the sash should not exceed 20 percent of the area of the panel. When window sizes exceed these provisions, they should be anchored directly to the building structure. This is usually accomplished by supporting them between channels anchored to the structure at the bottom and top of the panel opening. Door frames should be securely anchored to the structure at the sills. Large doors, or those receiving rough use, should be anchored at the top.

Underground Services Mapped For Emergency Needs

Stephen Kearney
City Engineer, Lowell, Mass.

Mapping of underground structures and utilities in Lowell, Mass., was undertaken recently as a WPA project. The city engineer's office had sectional maps of the entire city area of 14.1 square miles, each map on a scale of 50 ft. to the inch, representing 12 seconds of longitude by 12 seconds of latitude. Tracings of these sectional maps were used as the basis for the underground survey on which varicolored lines were used to represent: sewers and manholes; catchbasins and connections; water mains; gas mains; telephone conduits; electric light conduits; and any other special features, such as tunnels and private industrial water services.

On a scale of 50 ft. to the inch, the tracings of underground facilities in



All underground utilities in Lowell, Mass., are being mapped as a defense emergency aid. This is an actual reproduction of an intersection plan; accompanying it, but not shown here, are sectional views which give the depths of pipes and ducts.

some of the most important street junctions appeared as a tangled web. For clarification, therefore, a few of these were chosen to be made on the scale of 20 ft. to the inch, and it was possible to indicate the locations and depths of the various structures.

The few maps completed provided so much worth-while information that when the city was asked to recommend desirable WPA defense projects, one of the first to suggest itself was an elaboration of the initial project so as to provide maps for important street intersections. In addition, it was recommended that a tracing of the entire city area be made (scale 500 ft. to the inch) on which could be spotted all vital points such as: reservoirs and pumping stations; powerhouses and gas tanks; hospitals; river bridges; railroad bridges; through highways; and gasoline storage tanks.

These recommendations were adopted and a staff of WPA field and office workers is now engaged on the work under the sponsorship of the city engineering department. It is believed that the completed maps will be of inestimable value in any emergency.

The city is indebted to Walter F. Como, WPA divisional manager and Charles A. McGurty, divisional field engineer, for their cooperation in securing speedy approval and a proper personnel for this project, which is one of the first of its kind to be approved by the federal government.

Running British Cities in War Time

Contents in Brief—When a country goes into war, its city governments must take on additional duties for civilian defense and keep essential local services going. The effect upon British municipal governments of nearly two years of active war is described in the following abstract of a report issued by the American Municipal Association.

TO SHELTER THEIR PEOPLE against air attack and feed, house and otherwise care for those whose homes have been destroyed by bombs, British cities have been forced to make far-reaching changes in the structure of their governments, and in their relationship with the national government. This is revealed in a report just issued by the American Municipal Association, which states that changes in economic and social conditions brought about by air warfare have altered municipal activities "beyond expectation."

The cities were faced with tremendous decreases in tax revenue when property lost much of its taxability through continuous bombings (the British tax property on the basis of income from occupancy) and were forced to supply new and costly services in connection with the air raids. Cities now are operated largely with grants-in-aid from the national government, and for the most part all administrative control has been placed under the "air raid precautions controller" and a single council committee. The cities also have pooled resources for fire fighting, street repair and other functions and are coordinating these efforts with the aid of "regional commissioners" who represent the national government.

The regional commissioners—14 in all for the country—were appointed early in the war but took over complete supervision for the first time when aerial attacks became intense. They work especially to coordinate air raid shelter, care for the homeless, expedite clearance and repair, and approve all expenditures of the local authorities made from grants-in-aid by the national government. The regional commissioners are "the most significant wartime innovation in the British local governmental system," the report said.

A second innovation went into effect recently, when the national government announced the nationalization of the 1,400 fire departments in the country. This action was taken mainly because equipment and plans were not sufficiently standardized to make efficient functioning possible in an extensive emergency.

Manpower and money

To give the cities sufficient human resources for civil defense, a form of conscription was introduced in January this year requiring, if necessary, all persons between the ages of 16 and 60, both sexes, to perform civil defense duty without pay for a maximum of 48 hours a month. A similar order gave the Minister of Home Security the right to draw on regular conscript lists for other civil defense service in any part of the country. The national government arranged up to 10 shillings a day for men and 7 shillings for women as compensation for loss of working salary, traveling expenses and meals while on duty.

Besides the grants-in-aid, which reached 100 percent for air raid shelters, rest and feeding centers and a few other functions, British local governments have received other financial support. The national government took over full responsibility for care of the aged, allowances to dependents of men in the armed forces, compensation for civil injuries or property damage caused by enemy action, and for unemployment assistance to those not covered by the usual provisions. Interest-free advances, to be repaid after the war, were offered the cities to make up for income deficiencies. In March of this year localities were given permission to refund at lower interest rates bonds paying 4 percent or more.

Local responsibilities

Although some British local officials at first objected to the increased national supervision, the heavy responsibilities of the cities made unusual steps necessary, it was pointed out. On the one hand, the cities faced loss of funds and personnel for performing normal functions like accounting, road construction and refuse collection; on the other, there were new and unfamiliar duties, like housing the bombed-out, collecting time-bombs, and providing medical service to those injured in air raids, which were too extensive and costly for municipalities to bear by themselves.

Organization, training and coordination of a dozen or more different groups of specialists to take care of an air raid "incident"—the striking of a single bomb—is the job of local government officials. These groups include regular employes of the city government, auxiliary full-time or part-time employes, and volunteers. Auxiliary air raid wardens, and police and fire units are commanded by police and fire departments, casualty services are under the health department, while rescue, demolition and decontamination forces are under the city engineer. Utility crews operate from their own department.

When the fire-watching system was expanded in January, 1941, local authorities became responsible for determining adequacy of precaution plans prepared for business, commercial and factory premises. From the beginning, local police have been responsible for apprehending blackout offenders. When public air raid shelters came under government regulation, local authorities were instructed to employ extra personnel where necessary for shelter cleaning, to conduct health department inspections, provide nurses and medical aid posts and doctors, provide supervision for shelter wardens, and undertake campaigns for inoculations against diphtheria. In London these services are functioning for more than 7,000,000 people using public shelters.

For the bombed-out, local governments had to find vacancies in one-family houses or apartments, take over large empty houses or hotels (with compensation to owners), or billet victims with other families. To date, a reserve of houses sufficient to accommodate at least 35,000 to 40,000 persons has been built up in the London area. Rent control was a duty of local authorities.

Local governments also were made responsible for repairing damaged houses, the cost to be assessed against the property for recovery after the war if the owner did not himself arrange for repair. City governments assist in salvaging household goods and provide storage space and police guard.

Communal feeding establishments, later renamed "British restaurants," became a local government activity as a result of municipal feeding of homeless after the first London bombings. The national government pays capital costs of the restaurants. Advantages from the government's point of view are that these feeding centers provide a means of reducing food waste and fuel consumption, release persons for duties outside the household, combat hardships resulting from increased food prices, and afford an opportunity to raise the standard of nutrition for the country as a whole. London county has 147 of the restaurants, and more than 200 other communities have established them.

Local government even entered the agricultural field, through a "dig for victory" movement aimed at expansion of land cultivation. Cities took possession of unoccupied land, and of occupied land with consent of the owner, and turned it over to individual families to cultivate specified crops. In some cases golf courses were turned into gardens. A project to salvage kitchen waste resulted in establishment of municipal pig farms where, in January of this year, more than 16,000 pigs were flourishing, while the waste collected was sufficient to feed another 100,000 of the country's normal pig population of 4,000,000.

Retrenchment steps

The onslaught of unfamiliar functions brought about by warfare and wholesale destruction called for retrenchment wherever possible by the British cities. When the national government came to the aid of stricken localities with a system of grants and interest-free loans, local governments had to report all retrenchment steps and show that all possible economies were in effect.

The retrenchment program embraced suspension of all public works construction of a non-military character, including roads, and the use of "timber-saving" design in housing construction. In government offices, services of secretaries and staff members were pooled to save time and money, and both sides of the paper were used in letter writing and report making.

Approximately 1,000 local authorities granted "cost of living" bonuses to employes to help them meet increased expenses. Some cities, however, restricted promotions and suspended pay raises for duration of the war. At the first of the year, more than 90 percent of local governmental officers serving in the army were receiving supplemental pay, about half of them up to the full level of their civil compensation.

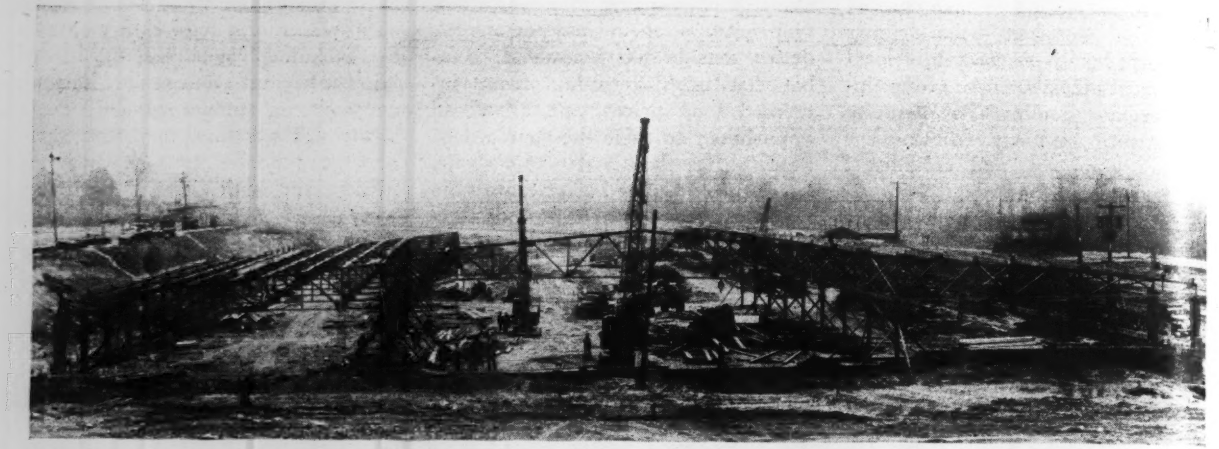
To assure experienced personnel if younger employees are drafted, police and firemen of pension age were forbidden to retire until the end of the war. In some cases women replaced men on municipal jobs, though local authorities have attempted to keep their "key" men by asking their exemption from military or naval service.

The British low-cost housing program, proceeding at a rate of 100,000 dwellings a year before outbreak of the war, has come to a complete standstill for lack of materials and labor. New houses built by local authorities during the first 10 months of the war numbered less than 7,000 units.

Nevada Snow and Runoff Surveys

Some of the Forecasts of streamflow in Nevada for 1940, based on snow surveys, were considerably below the actual results, according to the report of the Nevada Cooperative Snow Surveys for April, 1941. This discrepancy is attributed to the fact that in making the forecasts, too little attention was paid to winter rains in January and March, 1940. Much of this rainfall was above El. 7,000 and some as high as El. 8,000. This precipitation was so great as to bring the winter total to 158 to 179 percent above normal at six of the observation stations, representing a rise of 12 to 31 in. in water level. But this increase was not evident from the snow surveys because of so much rain, much of which must have been stored in the ground until spring.

On the other hand, the discharges of the Carson and Walker rivers checked very closely with the forecasts, the predicted flow being 71 to 80 percent of normal, while the actual results were 76 to 93 percent of normal. As to the outlook for 1941, the report states that the October-November precipitation of 1940 was slightly above normal and the December precipitation was unusually heavy, so that the snow surveys of Feb. 1 showed higher water content than for the same date of 1940. However, winter rains and high temperature in February, together with deficient precipitation in March, have kept most of the courses under the water-content record of April 1, 1940.



Steel trusses of cantilever design went up in three sections. The structure is 224 x 885 ft. in plan, and is windowless and completely air conditioned. Excavation of the plant site involved moving 260,000 cu. yd. of material.

Roof Trusses Go Up in 76 Hours

Contents in Brief—*Fluorescent lamp plant of 224x885-ft. area completed in less than five months at Fairmont, W. Va., by Westinghouse. About 710 tons of structural steel was placed in 76½ working hours. Cantilever type roof trusses raised in three sections. Concrete floor framed over fill area. Complete air conditioning dictated by manufacturing requirements.*

ERECTION OF 710 tons of structural steel in 76½ hours of working time indicates the accelerated construction schedule that has been maintained by the Westinghouse Electric & Mfg. Co. in building a $3,000,000 fluorescent lamp plant near Fairmont, W. Va. Work at the site started the first of March and lamp production is scheduled to start in July. In addition to the main building (224 x 885 ft.) the present construction operations have included several smaller buildings, the grading of the entire site for ultimate development, installation of storm drains and sanitary sewer, and the extending of service roads and railroad spurs into the area. The main lamp plant building includes several interesting design and construction features which are reviewed in this article.

General features

To meet the demand for fluorescent lamps, which has been accelerated by the increasing number of "blackout" industrial plants built during the past few months, an extensive increase in the company's production capacity was required on relatively short notice. General requirements for the plant location included an adequate supply of fuel gas, both for the present tube plant and the projected glass factory (ultimate demand 40,000,000 cu.ft. per month) together with an adequate supply of labor suited to light manufacturing operations. The selected site is about two miles north of Fairmont near the Monongehela River, adjacent to an existing highway, railroad and a gas transmission line.

The area has a considerable slope toward the river, which was corrected by benching at three levels, for the present building and two future units. Indicating that heavy construction operations often form an important feature of industrial building projects, this excavation work involved the handling of about 260,000 cu.yd. of material varying from hard rock to soft clay. These operations were carried out with tractor and carrying scraper units, following a plan that was designed to balance cut-and-fill on the site.

Side hill drainage is handled by diverting the runoff from two small ravines above the site into 48-in. reinforced concrete storm sewers which pass through the area, picking up the drainage from roofs and yard.

Handling the foundations

Elevation of the area for the main lamp building placed most of the floor area on undisturbed material in cut. However, a depression crossing near the center of the site required a fill with a maximum depth of about 15 ft. to bring it up to floor level, and a similar fill was required at one end.

In these fill areas the concrete footings were poured on suitable foundation material prior to the placing of fill. Then, because suitable equipment was not available to place concrete in the supporting piers as the fill was advanced, and also to save time, sections of 36-in. corrugated culvert pipe were used to carry up these openings in the fill as it was raised to floor level.

Material was moved in by scrapers, deposited and compacted in 6-in. layers around the vertical pipe sections, and as it advanced the pipes were extended by tack-welding on additional 4-ft. lengths. After the fill had been completed, reinforcing cages were dropped into the pipes and the concrete columns poured in one lift.

If the building were to be used for ordinary manufacturing purposes, this modern fill would have provided adequate support and been subject to such a small settlement that the concrete floor slab could have been extended across this area. However, the machines used for making the fluorescent lamp tubes require connections for several types of gas supply, including hydrogen and oxygen, and this hazard, in case of minor settlement, resulted in the design of a regular beam and girder supporting system for the floor slab over the fill area. This supporting system was designed for a live load of 250 lb. per sq.ft.

Building design

The main plant is a single-story structure 224 x 885 ft. in plan, with brick bearing walls and steel roof trusses. These trusses are continuous over three spans, of cantilever type, and provide 60-ft. side spans and a central working area 100 ft. wide. Longitudinally the building is divided into 24½-ft. bays. The structure is windowless, except for the cafeteria, and has a roof without openings.

This windowless design, with its necessity for complete air conditioning, was not used with the intention of providing a "blackout" plant in the current meaning of the term, but was necessitated by the requirement for control of working conditions in the plant, with special reference to dust-free air which is essential in fluorescent tube manufacture. Dust particles lodged on the inside of the tubes prior to coating, produce irregularities in the surfacing which seriously affect the operation and life of the lamps. For this reason the regular air conditioning system is supplemented by the electric-precipitation process of dust removal. Further, the shipping and receiving rooms are provided with double doors to aid in keeping outside dust from getting into the plant.

The original building schedule called for the completion of brick bearing walls prior to the arrival and erection of the roof trusses. Steel delivery time exceeded expectations and it was necessary to lay-up the brick columns in advance of the wall.

Original design of the roof trusses provided for all-welded construction, but difficulty in securing the type of rolled shapes required for this fabrication method, resulted in changing the design to riveted connections. General characteristics of truss design are indicated in the accompanying drawing. The 60-ft. 7-in. side spans have a horizontal bottom chord and serve as the anchor arms for 14-ft. 8-in. cantilever sections with steeply inclined bottom chord. The suspended span is 100 ft. long between pin connections, and has a bottom chord that is practically horizontal, with only a 6-in. rise. The upper chord maintains an unbroken slope from ridge to wall. Vertical clearance in the side bays is 14 ft. and an 18-ft. clearance is provided through the center aisle, necessitated by manufacturing requirements. Columns are 8-in. H-sections of 34.3 lb. weight.

The trusses were fabricated in three sections and were handled on the job in these units by crawler crane. The erection crew of 25 men set the 710 tons of structural steel in a working time of 76½ hours. The procedure was to set nine pairs of side trusses and then place the corresponding number of suspended spans, with their pin connections.

Erection bracing of steel columns was required in order that trusses resting on top of these columns and exterior masonry piers would not pull them over. This bracing consisted of four timber 4 x 4's against the columns, and nailed to stakes.

While truss erection was going forward a truck crane was setting the purlins. These were 12-in. channels and were tack-welded to the top chord of the trusses at from 7-ft. 2-in. to 7-ft. 7-in. spacing.

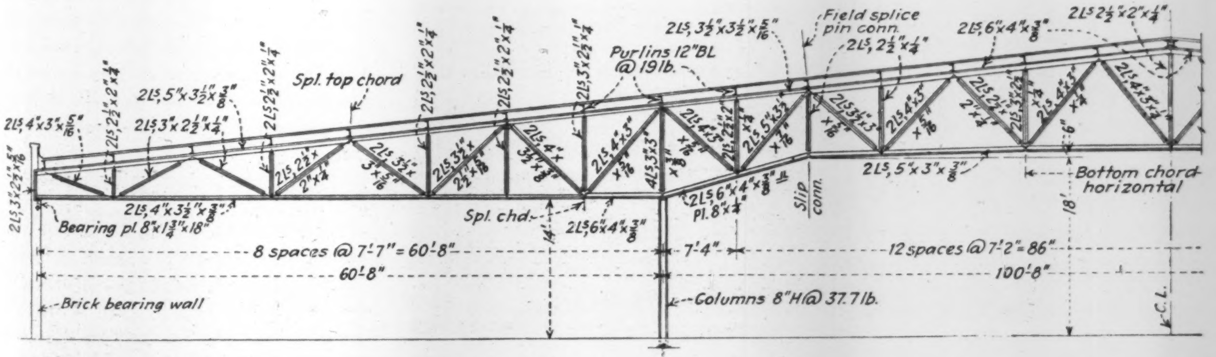
Poured gypsum roof

The roof is the poured gypsum type completed by a built-up membrane covering. The first step is to lay light steel shapes, resembling small rails, spaced at 32 in., at right angles to the purlins. On the flange portion of these shapes gypsum board is placed and covered with a light wire mesh. The gypsum material and water are then mixed by hand in a box on the roof and dumped (see illustration) into these areas, followed by rough screeding using the tops of the supporting rails to secure the 2½-in. thickness of pour on top of the ½-in. board. This surface is not finished smooth or given any special curing treatment. In 3 hr. it has set sufficiently for the placing of the built-up membrane surfacing.

The 5-in. concrete floor slab was poured directly on the ground except over the fill area where it was supported on beam and girder framing as already described. This slab reinforced by wire mesh (6 x 6-in. of #6 gage) was placed with a paver which poured the entire 60-ft. width of side span in one pass, taking two for the 100-ft. width of central aisle. This floor slab was cut into sections approximately 50 by 60 ft. with construction joints which were provided with cork filler. Covering the slab is a ¾-in. topping of asphaltic mix.

Utility services

The most unusual utility requirement is the extent of piping to convey



Half section of the 222-ft. roof truss which provided 60 ft. 8-in. side spans with 14½-ft. cantilever arms. The suspended span of 71 ft. 8 in. was pin-connected along the top chord. The 18-ft. clearance was required in the main aisle.

Pouring the gypsum roof on gypsum board supported on steel runners. Note the wire mesh. The poured material was struck off with timber screed to a $2\frac{1}{2}$-in. thickness. A built-up membrane covering completes the roof.

several types of gas to the numerous machines on the manufacturing floor. Many of these machines must be supplied with two pressures of compressed air, oxygen, hydrogen and argon gas, all in separate piping. These gas supply systems and other utilities are supported on the lower chord of the roof trusses with vertical connections to the individual machines. Changes in the manufacturing process with resulting shifting of the machine units make it impracticable to place these utilities in the floor slab.

Fluorescent lighting is provided over the entire manufacturing area with half the units supported directly from the horizontal lower chords of the trusses in the side spans and from roof purlins in the central area. This 25-ft. spacing of the lighting units is cut in half by corresponding rows of units suspended midway between the trusses. Height of the lighting units is maintained at about 13 ft. above the floor and the lighting intensity in the manufacturing area is approximately 25 foot-candles. Fluorescent lighting in the office provides 50-foot-candle intensity.

Air conditioning

The air conditioning system is designed with zone control to effect a closer relation to atmospheric temperature requirements in various parts of the building. Because of the amount of gas burned the system does not provide for recirculation in the main room although this type of system is utilized in the conditioning of the offices. The air ducts are supported on the lower chords of the trusses extending from the coils and blowers located in the same general position. When heating is required in the building, individual gas fired units are used. All air entering the system passes through electric-precipitation units for removal of dust particles, as indicated.

The unique part of the air conditioning system is the method of air cooling which utilizes a supply of 56-deg. water pumped from an abandoned coal mine in the vicinity of the plant. This adequate supply of cool water, piped through a cast iron system because of its corrosive character, is circulated through monel metal cooling coils and then returned to the mine. The air conditioning requirement provides for the maximum use of 3,600 gpm. from the mine and the pumping lift is approximately 150 feet.

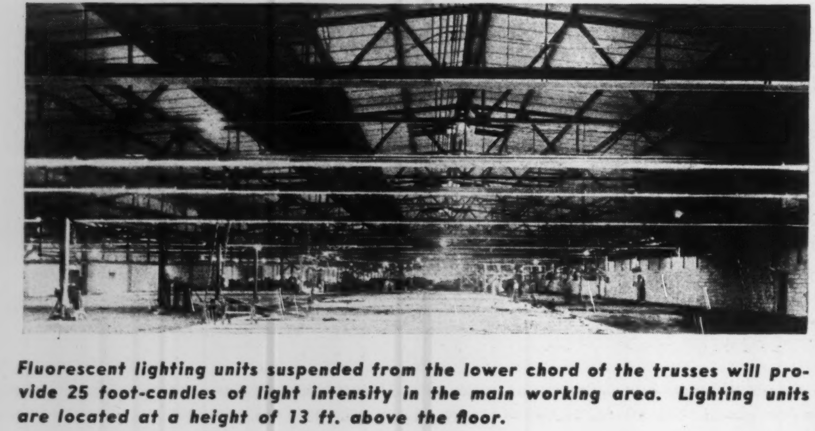
Among the miscellaneous features of construction work required on the project was the building of about $\frac{1}{2}$ mile of railroad siding from nearby tracks to loading platforms on both sides of the plant building. This railroad track has been designed to provide for the extension of two spurs along the sides of the glass plant when that structure is built.

Access roads lead to the main entrance where a parking lot is provided and buses will discharge passengers. All employees pass from this main entrance through a checking gate into the plant. The plant area will be adequately fenced and the buildings floodlighted.

Organization

Design and construction of the plant is under the supervision of George Parkman, director, building construction and maintenance, of the Westinghouse Electric & Mfg. Co. Mr. Parkman heads the newly created construction department of the company. Design was under the direction of Chas. B. Sittman, chief designer, construction department. At the site work was supervised by George W. Schusler, general construction superintendent.

Grading and storm drain construction was carried out by Adam Eidemiller, Greensburg, Pa. Concrete was put in by Robert E. Lamb & Son, Philadelphia. Structural steel was supplied by the Ingalls Iron Works of Verona, Pa., and erected by Catonsville Steel Erection Co., Baltimore. Lathrop Hoge Construction Co. placed the poured gypsum roof.



Fluorescent lighting units suspended from the lower chord of the trusses will provide 25 foot-candles of light intensity in the main working area. Lighting units are located at a height of 13 ft. above the floor.

Dynamic Tests on Bridge Models

F. B. Farquharson
Prof. of Civil Engineering, University of Washington

***Contents in Brief**—Plans are under way at the University of Washington for a testing laboratory in which to study the effect of winds at various angles on models of complete suspension bridges. In preparation for these studies, theories of stress and deflection relationships between the model and prototype in dynamic tests have been examined and their essentials are here summarized.*

FAILURE of the Tacoma Narrows Bridge brought to light a disturbing and dangerous tendency in suspension bridge design that has been developing slowly for twenty-five years without having been properly appraised and recognized. This failure has brought about a critical reexamination of many recently built large suspension structures to find just what their critical wind velocities are. Heretofore this question has not had a hearing on design of suspension bridges; now it is apparent that some rational basis must be determined by means of which these critical velocities can be ascertained with some exactitude.

To meet this challenge, plans are under way at the University of Washington for constructing a laboratory in which to make dynamic tests on scale models representing the full length of the prototypes. This plan avoids the errors introduced by end effects and other indeterminate factors that have complicated results or nullified the value of wind tunnel tests on sectional models. An important factor in planning these studies is that high wind velocities are not necessary. In the following are outlined, first, the basic theories and then the plans for the proposed laboratory.

Mathematical relationship

The use of static wind tunnel models of a small portion of the structure do not by themselves yield conclusive evidence regarding the behavior of a suspension bridge under the action of wind forces. Fully satisfactory results require a model of the complete structure whose full length can be subjected to a wind that can be directed against the model at different angles, in both vertical and horizontal planes.

The proper proportions for such a model are governed by the laws of similarity, which require that stresses and deflections in the model structure arise with proper scale relation to the prototype under the action of a stream of air developing a flow pattern across the structure geometrically similar to that on the prototype.

To obtain these conditions it is necessary that three similarly relationships be brought into harmony. Two of these are related to the flow of air over the structure and the third deals with elastic and dynamic similarity. These three similarity requirements are:

1. *Similarity Considering Inertia and Gravity Forces Only.* (Neglecting viscosity and compressibility of the air.)—The ratio between the inertia force and the gravity force must be a constant for both model and prototype, that is

$$\frac{\text{Inertia force}}{\text{Gravity force}} = \frac{V^2}{Lg} = \text{Const.}$$

Where V = velocity; g = acceleration of gravity and L = a linear dimension.

This similarity condition is satisfied when the model velocity is related to the prototype velocity in the ratio of the square root of the scale reduction between them. Thus, if the model bridge is built to one-hundredth scale, the wind velocity on the model will be one-tenth of that on the prototype. This criterion for similarity is known as Froude's law.

2. *Similarity Considering Inertia and Viscosity.* (Neglecting gravity and compressibility of the air.)—The ratio between the inertia force and the frictional force must be a constant for both model and prototype, that is

$$\frac{\text{Inertia force}}{\text{Frictional force}} = \frac{rVL}{m} = \text{Const.}$$

Where r = mass density; m = viscosity coefficient; V = velocity; L = a linear dimension.

Thus, for the same temperature and density conditions on model and prototype, a one-hundredth scale model will require a wind velocity one hundred times as great as the prototype wind, if a geometrically similar flow is to be developed. This criterion for similarity is known as Reynolds' Law.

3. *Static and Dynamic Similarity.*—The proper stress, strain and deflection relationships between model and prototype will be satisfied when the following ratios are maintained:

Lengths: $\frac{L_p}{L_m} = n$

Forces: $\frac{F_p}{F_m} = K$

Weights: $\frac{W_p}{W_m} = K$

Cross-sections of members: $\frac{A_p}{A_m} = K\frac{E_m}{E_p}$

Densities: $\frac{w_p}{w_m} = \frac{1}{n}\frac{E_p}{E_m}$

Moments of inertia: $\frac{I_p}{I_m} = n^2 K \frac{E_p}{E_m}$

Unit strains: $\frac{e_p}{e_m} = 1$

Unit stresses: $\frac{S_p}{S_m} = \frac{E_p}{E_m}$

Times: $\frac{t_p}{t_m} = \sqrt{n}$

Velocities: $\frac{V_p}{V_m} = \sqrt{n}$

In the foregoing n is the space scale, K is the force scale, and E represents modulus of elasticity.

When direct stress is present in the model in conjunction with torsional distortions, the ratio of the shearing moduli between model and prototype must equal the ratio between Young's moduli.

If these three similarity conditions are attempted on a given structure it is evident that conditions one and two are in conflict. Froude's Law requires that wind velocity decrease with reduction in scale while Reynold's Law calls for an increase in wind velocity for a similar scale reduction.

From a practical point of view, however, it appears that the flow pattern on sections encountered in bridge design do not change appreciably with change in Reynold's Number. Limited tests in the wind tunnel involving different velocities on the same model seem to support this view and the following statement by Prandtl and Tietjens in "*Applied Hydro- and Aeromechanics*", p. 93, offers further evidence:

"The simple relations just outlined (constant drag coefficients) are practically true for bodies where the total drag consists almost exclusively of pressure drag and where the geometry of the flow, in particular the breaking away of the fluid, is determined by sharp edges (as, for instance, with a plate perpendicular to the direction of the flow)."

It would therefore seem reasonable to assume that a satisfactory model equivalent for this type of structure will develop if the first and third similarity conditions are satisfied.

From condition (1) the following "force scale—space scale" relationships may be developed:

$$\begin{array}{ccc} \textit{Prototype} & & \textit{Model} \\ \dfrac{C_D\, r/_2\, A\, V^2_p}{\text{Force scale}} & = & \dfrac{C_D\, r/_2\, A\, V^2_m}{(\text{Space scale})\ 2} \end{array} \qquad (1)$$

C_D, the drag coefficient, is the same in each case within the assumptions just made in connection with condition two, thus Eq. 1 becomes

$$V_m = \frac{(\text{Space scale})}{\sqrt{\text{Force scale}}} V_p \qquad (2)$$

But if Froude's Law is to be satisfied

$$V_p = V_m \sqrt{\text{Space scale}} \qquad (3)$$

Therefore, substituting Eq. 3 in Eq. 2:

$$\text{Force scale} = (\text{Space scale})^3$$

Thus, only one combination of the criteria outlined in condition three will yield a model of proper similarity and it follows that K in condition three must equal n^3.

Having selected an appropriate space scale there remains only the problem of constructing the model from the most suitable materials, keeping in mind the similarity requirements of condition three. This phase of the problem is bounded by certain very definite limits, as will be noted in the accompanying table.

FORCE SCALES AND VELOCITIES FOR VARIOUS SPACE SCALES

(Velocities listed correspond to 125 mph. on the prototype which is assumed to be a sufficiently high upper limit of investigation.)

Space Scale	Force Scale	Velocity mph.
100	1,000,000	12.5
90	729,000	13.2
80	512,000	14.0
70	343,000	14.9
60	216,000	16.2
50	125,000	17.6
40	64,000	19.8

As a means of demonstrating the application of this reasoning to an actual case, let us assume a bridge which will measure 50 ft. in width with suspenders 50 ft. apart and a weight per bay of 350,000 lb. A space scale as low as 40, involving a model bay weighing about 5½ lb. might present difficulties in getting a structure of proper weight, stiffness and shape. On the other hand a space scale as high as 70, which would call for a model bay weighing about 1 lb., would present difficulties in the other direction.

The final selection of space scale must necessarily rest on a decision regarding the materials and form of construction of the model. There is wide leeway with the metals and plastics now available. The larger models may tend to become so bulky that a proper shape cannot be maintained while keeping the flow of air to true scale. Increasing the scale reduction leads to models whose sections are so thin as to be unworkable. Between these two extremes and depending upon the materials selected there always is some scale factor that will permit the making of a rational model.

The table suggests that an additional factor may have some bearing on final selection of space scale, namely the maximum wind velocity required for the test. Since any space scale likely to prove reasonable yields a maximum wind velocity that falls under 20 mph. and since the size of the model is such as to require a special wind tunnel, it seems that the wind velocity requirements will not particularly influence the selection of a space scale.

Plans for the new laboratory

The design of a suspension bridge is a mathematically complex problem at best because it involves the interaction of main span, side spans and towers. When the question of unstable aerodynamic properties is superimposed on these basic complexities, it is a practical impossibility to arrive at satisfactory conclusions by mathematical means alone. For some time now, the model method has been generally accepted as a satisfactory means of avoiding some of the mathematical difficulties in problems of static forces, but it was not until the Tacoma Narrows Bridge was studied that these models were made dynamic.

Dynamic tests on models of complete bridge structure could be made only in the very largest wind tunnels. Any such tests would meet four serious objections: (1) There are only a few large tunnels in existence, and these are now very busy on urgent aviation problems; (2) because a full length model would have to be assembled in the wind tunnel, the tunnel could not be used on other work for a period of many weeks; (3) to simulate a prototype velocity of 125 mph., velocities in the wind tunnel would have to be less than 20 mph.; much of the work would be done at velocities of 5 and 6 mph. (considerable vertical motion was noted on the Tacoma Narrows Bridge in winds as low as 5 mph.) and there is question as to whether equipment in the large wind tunnels could be run at so low a speed; finally, (4) it is desirable to study the effects of winds at angles other than normal to the bridge centerline, a requirement not easily met in the large wind tunnel as built for aviation tests.

For these reasons, dynamic models thus far built have been artificially activated. Recent studies resulting in the theories outlined in the foregoing indicate that a proper selection of space scale on a dynamic model will permit making a complete study at wind velocities not to exceed 18 or 20 mph.

With the purpose of applying these theories, designs have been prepared for equipment that will permit of dynamic tests on suspension bridge models up to 100 ft. in length. In general, the plan is to develop a wind source within a vertical plane area 100 ft. long by about 4 ft. high. This will be done by assembling blower units each serving this total area. Each unit will contain two fans capable of producing wind velocities up to 20 mph., independently adjustable as to height and direction of delivery of the air blast in a vertical plane covering an angular range of plus or minus 15 deg. The air flow may be deflected in a longitudinal direction as much as 45 deg. by movable vanes mounted in the discharge orifice of the air duct.

Wellpoints Unwater Drydock Site to El.-45

***Contents in Brief**—In constructing a Navy drydock at San Diego time and expense involved in building a cofferdam (estimated to cost about $500,000) were saved by putting down wellpoints in three successive stages with risers 21 ft. long. Despite material with considerable clay content, unfavorable to wellpoint operation, excavation is carried on in the dry with slopes of 1:1¼.*

CONSTRUCTION of a cruiser graving dock for the U. S. Navy made it necessary to excavate some 400,000 cu. yd. from a 340x720-ft. area on the shore of the bay at San Diego, Calif. The material handled contains far too high a percentage of clay to be ideal for wellpoint operation. However, to avoid the delay and cost of a cofferdam, it was decided to try to lower the water level with the aid of wellpoints and work has been under way on that basis since last February. With the excavation about 60 percent complete (as of the middle of June, 1941), the success of the wellpoint method has been demonstrated and excavation has progressed continuously from the start as compared to the considerable delay (and cost, estimated at about $500,000) that otherwise would have been required for building some form of cofferdam.

The first operation was the excavation, with draglines, of trenches in which to lay headers for carrying away the discharge drawn from wellpoints by pumping units. In the trench bottoms a rotary drill rig, of the type used in well drilling, is used to put down a hole about 12 in. in diameter to the required depth, usually about 25 ft. Improvements in the design and methods of handling these drills decreased the time of putting them down until a speed of 25 ft. in 9 min. was attained. When the drill is taken out of the hole an 8-in. well casing is promptly jetted down where the drill has been. That is, water under pressure is applied at the top of the casing and allowed to escape at the bottom. This carries the material from inside out around the bottom and the escaping water, flowing up around the outer side of the casing, aids in the sinking.

When the casing is down, the wellpoint and riser are put down inside and around them is dumped No. 14 gravel and coarse sand until the casing is full. The casing is then pulled to be used again, leaving the riser in a hole or well, filled with porous material.

The 8-in. header pipe has connections at 2-ft. intervals, each consisting of half of a 1½-in. coupling welded to the header around holes previously

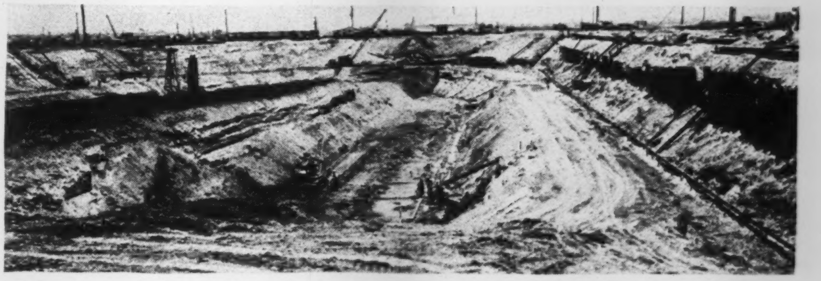


Fig. 1. Some 400,000 cu. yd. is here being excavated in the dry to a depth 45 ft. below water level in the adjoining bay.

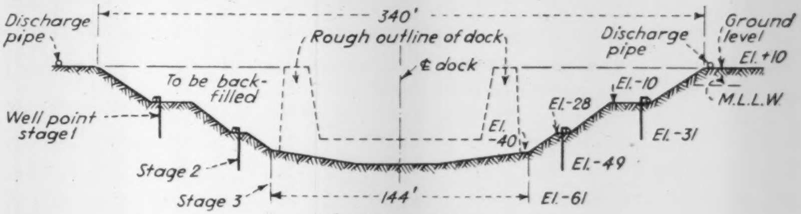


Fig. 2. Typical cross-section of drydock excavation.

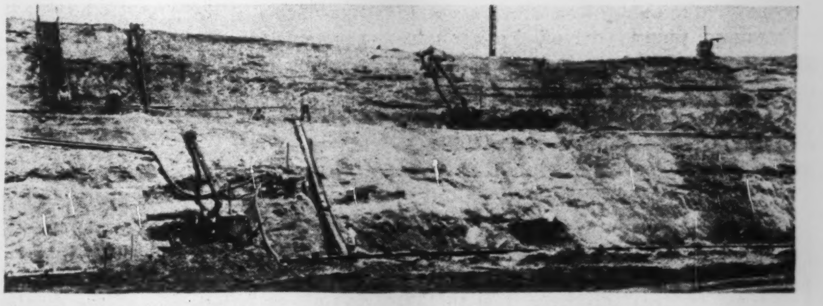


Fig. 3. A large number of wellpoints, in successive stages, made possible dry excavation with the steep side slopes here shown.

burned for this purpose. By putting these connections on a 2-ft. spacing it is possible to vary the space between wellpoints anywhere from 2 to 6 ft., according to material encountered. Connections from wellpoint to header include a union and a stopcock, thus permitting adjustment of connecting pipe lengths as well as a valve to regulate the rate of flow from any of the wellpoints.

The 8-in. headers are continuous around all four sides of the excavation but are divided into sections of several hundred feet by gate valves used to regulate the length of header from which each pump shall draw. Thus flexibility in pumping operation is provided to suit requirements that vary with density of the material. This varies widely and the "duty" of one pumping unit on this job ranges, in different parts of the work, from 50 to 80 wellpoints.

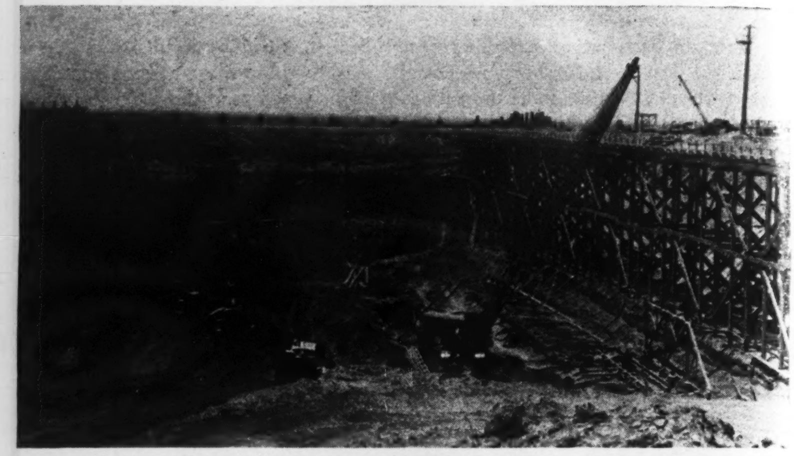


Fig. 5. Excavation nearing full depth, "plug" visible in outer end. Crane is assembling steel trusses (for transverse concrete conveyor) that will move on tracks carried by trestles just outside the concrete walls of the drydock.

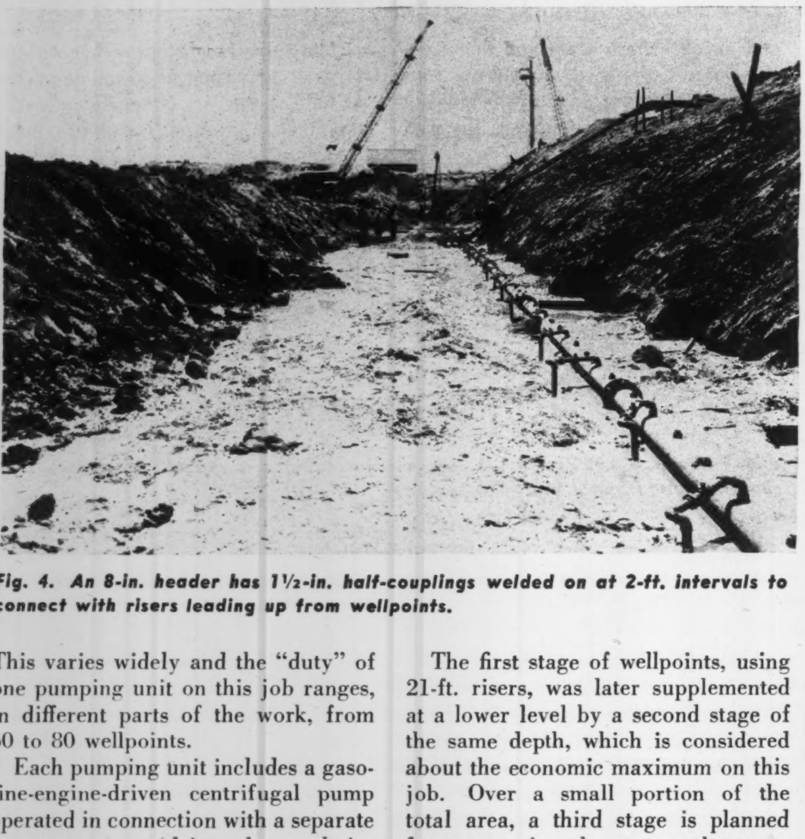


Fig. 4. An 8-in. header has 1½-in. half-couplings welded on at 2-ft. intervals to connect with risers leading up from wellpoints.

Each pumping unit includes a gasoline-engine-driven centrifugal pump operated in connection with a separate vacuum pump (driven by a chain-drive from the main engine shaft) and the vacuum rating for the combination is 60 cu. ft. of free air per minute. This suction is provided to maintain continuous inflow to the wellpoint regardless of variation in the quantity of flow reaching adjacent points or the varying proportion of air and water drawn out. Flows have varied on this job from 100 to 800 gpm. per pumping unit.

The first stage of wellpoints, using 21-ft. risers, was later supplemented at a lower level by a second stage of the same depth, which is considered about the economic maximum on this job. Over a small portion of the total area, a third stage is planned for unwatering the area to be occupied by drydock pumping units and sump.

Much Water Pumped

From the two headers fed by wellpoints of the first and second stages, a constant outflow of about 2 mgd. was being maintained in the middle of June, pumping against a head of 60 ft. Along either side of the drydock a line of large pipe (24 to 36-in. diameter) carries away the combined discharge from the several pumping units.

Excavation in the unwatered area is being carried on largely by tractor-drawn, 16-cu. yd. carrying scrapers (draglines are used for supplemental work and for digging the trenches in which the headers are laid). Under protection of the wellpoints the material is dry enough to permit of effective handling and the sides of the excavation stand on slopes as steep as 1 to 1¼. The construction program is to excavate the main area of the drydock leaving for later removal that portion of the fill across the outer end (referred to as "the plug") that keeps out tidewater. A rock-and-earth fill built into the bay in semicircular form extending around this outer end of the dock will later make it possible to pump out the water from the bay side of the plug and permit of final excavation in the dry.

The work is being done under a cost-plus-fixed-fee contract by the Pacific Bridge Co., negotiated by Rear Admiral Ben Moreell, C.E.C. Corps, Chief, Bureau of Yards and Docks, contracting officer representing the Secretary of the Navy. Capt. J. T. Mathews, C.E.C. officer in charge and public works officer, 11th Naval District, Lt.-Comdr. Alexander Martin (C.E.C.) is resident officer in charge at the site. Lt. (j.g.) J. J. Albers (C.E.C.) is assistant officer in charge.

W. G. Swigert is president of the Pacific Bridge Co.; T. M. Kuss is chief engineer and Ralph T. Keenan is project manager on the drydock. The John W. Stang Corp. built and installed the wellpoint equipment.

From Field and Office

Working problems and time-saving methods for engineers and contractors

Emergency Sounding Rod

For unexpected test holes needed during construction, a twisted reinforcing rod can be used, quickly and efficiently. One end of the rod should have a screw point. Any piece of cast iron, such as a crane counter weight, or the weight used on a tripod drill, makes a good hammer when suspended on a fall line. If no crane or derrick is available a gin pole with a block and fall will answer the purpose.

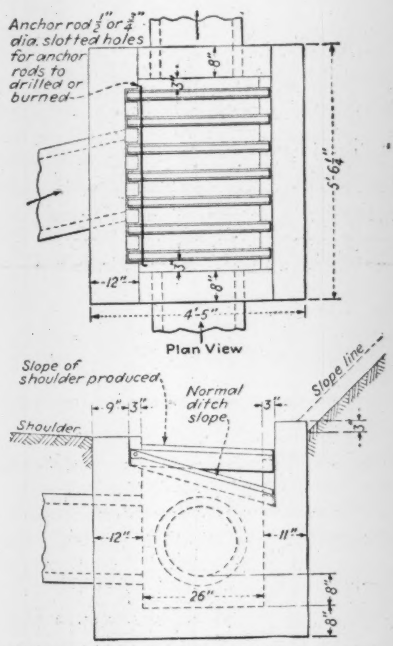
A 10-ft. rod is used as a starter, followed by a 20-ft. rod, then the drill rod is lengthened in 10-ft. steps by welding on new sections. In this manner it is possible to drill a hole 60 or 70 ft. in depth, through packed sand, clay or dirt. The drilled material must be free of boulders. The drill is removed by a chain sling at the top, which involves a twist in the hoisting line, easily removed, by unhooking the chain.

This method is very handy in river work when a soft pocket is found in the bed of the river, as information can be quickly secured and even though it may be approximate, a decision can be made at once regarding the need of further testing.—C. E. NIGHTINGALE, *Old Greenwich, Conn.*

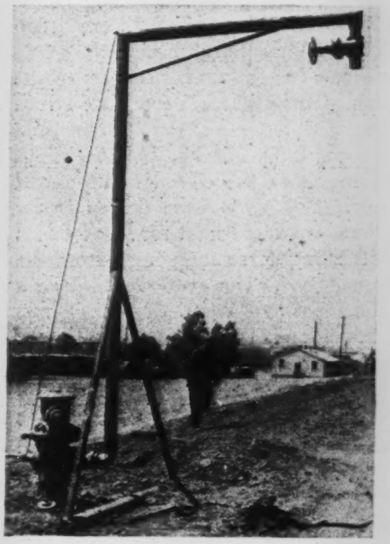
Safe Drainage Inlet

Designed for maximum safety and economy, this drainage inlet is in general use on the Pennsylvania Turnpike. The photo shows it in design location set almost flush with the ground and with only small projections to impede a car out of control. Relay 45-lb. rails at 6½-in. centers fashion the warped surface to trap flowing water. Rails are individually removable for cleaning the inlet.

Warped surface is secured by used rails placed in individual pockets.


Anchor rod ⅝" or ¾" dia. slotted holes for anchor rods to drilled or burned
8"
5"
5'-6¼"
12"
4'-5"
Plan View
Slope of shoulder produced
Normal ditch slope
9"
3"
3"
Slope line
Shoulder
3½"
12"
11"
26"
8"
8"

Plan and end elevation of inlet for typical condition. Arrows indicate flow.

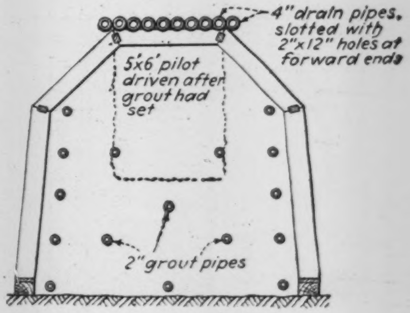


A CONVENIENT RIG for putting a globe valve at the right height for filling a tank truck has been used at Camp San Luis Obispo, Calif., where the contractor's shop has welded up a 4-in. pipe standard as shown above. The base diagonals give the standpipe stiffness in the plane of the triangle while stability in a plane at right-angles thereto is given by the tie cable extending from a welded lug at the top of the vertical pipe to the rear of the hydrant. The pipe can be quickly detached to permit full use of the hydrant.

Grout Holds Debris in Fissure While Tunnel Goes Through

A troublesome fissue in the Elton Tunnel, recently driven in Utah by the International Smelting and Refining Co., was successfully held by an unusual grouting method. When the tunnel had been advanced some 8,000 ft. and was in solid rock formation, a fissure 8 to 10 ft. wide was encountered containing gravel, quicksand and water. The water was under pressures of about 300 lb. per sq. in. When the heading broke into this fissure, a sudden inflow of debris was crowded into the tunnel, plugging it tightly for some distance and carrying muck back for 180 ft. It was obvious that some special method would be needed.

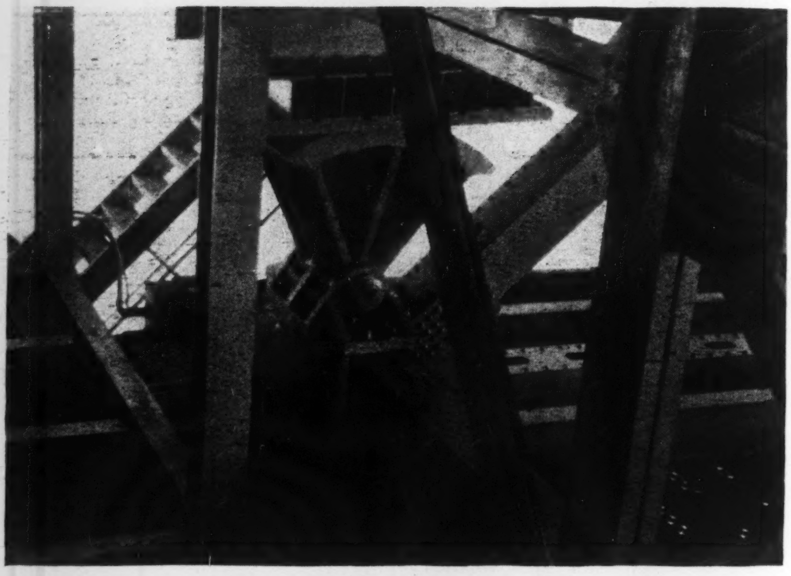
After the debris choking the tunnel had been removed to within a short distance of the fissure and there held by 6x8-in. breast boards set up close to the arch of the tunnel timbers, the water flow of some 300 gpm. was trapped in a group of ten 4-in. drain pipes 26-ft. long, driven in over the crown segment of the timbering. These pipes were slotted on their upper periphery to admit the


4" drain pipes, slotted with 2"x12" holes at forward ends
5'x6' pilot driven after grout had set
2" grout pipes

Cross-section of tunnel showing location of 4-in. drain pipes and 2-in. grout pipes.

water draining in from the fissure.

Sixteen 2-in. pipes were then driven horizontally through the muck which filled the tunnel section to the arch. These pipes were also 26 ft. long and the grout outlets consisted of two ½x2-in. holes, located about 12 in. from the closed and pointed ends. The pipes were driven in by a hand-operated ram made of 65-lb. rails slung (free to swing) from the tunnel roof. The grout mix (1 sack of cement to 45 gal. of water) was first pumped into the upper pipes under pressures ranging up to 900 lb. per sq. in. This was continued until grout began to escape with water through the 4-in. drains. In this way 153 sacks of cement were used. Additional grouting, using 96 sacks of cement, was done in the bottom and side holes in the endeavor to force as much grout as possible into the fissure outside the tunnel section and get it well dispersed therein. After the grout had set, a pilot tunnel 5x6 ft. in section was driven through the fissure to the solid rock beyond. This was subsequently enlarged to full 10x11-ft. section without difficulty.



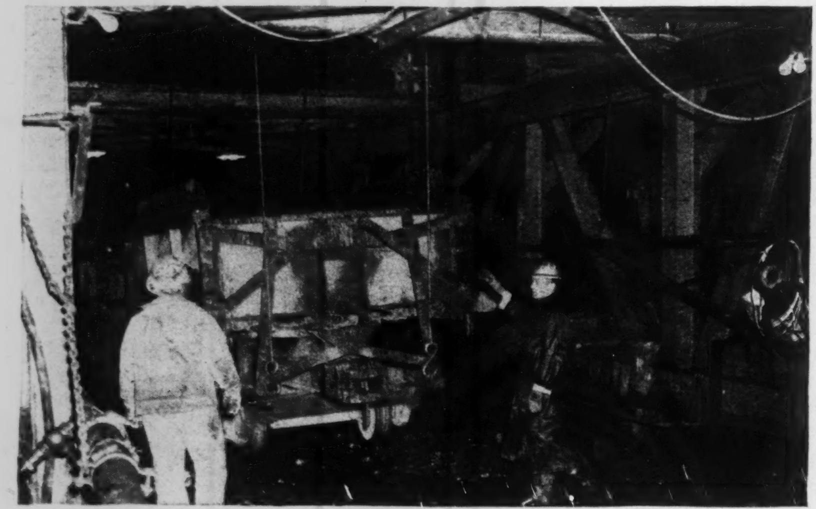
Temperature of the pontoon bridge is indicated by this rocker arm.

As Good as a Mechanical Thermometer

This rocker arm at one end of the Lake Washington floating concrete bridge is a device which indicates temperature although not built for this purpose. Note the rocker's inclination to the right, which indicates that the picture was taken when the temperature was higher than the annual mean. The floating portion of the bridge is to the left; as it expands the rocker is crowded shoreward or to the right. In very cold weather, the inclination will be a maximum in the opposite direction.

Theoretically, 30 in. of movement (15 in. each way), is possible, for Seattle temperature extremes, in the almost 5,000 ft. of bridge whose movement is taken up here. Practically, a considerable part of the movement is expected to be taken up in compression of the structure.

Above the rocker arm there is a trunnion, at right angles to the rocker axis, permitting lateral movement. The ends of the floating portion of the bridge—as the result of wind, waves, water level fluctuations and temperature—move in an elliptical orbit whose vertical axis is about 3 ft. and horizontal axis 2 ft. The rocker installations are the same on both ends.



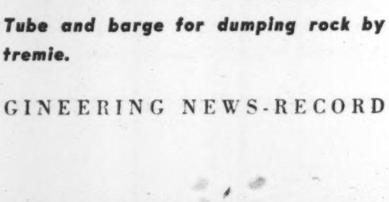
U. S. Army Engineers

EMPTY MUCK CARS in the 23-ft. diversion tunnel at Mud Mountain Dam were lifted off the track and held up out of the way by a pair of motor-driven hoists in the double-deck drill jumbo while full cars were moved back from the face.

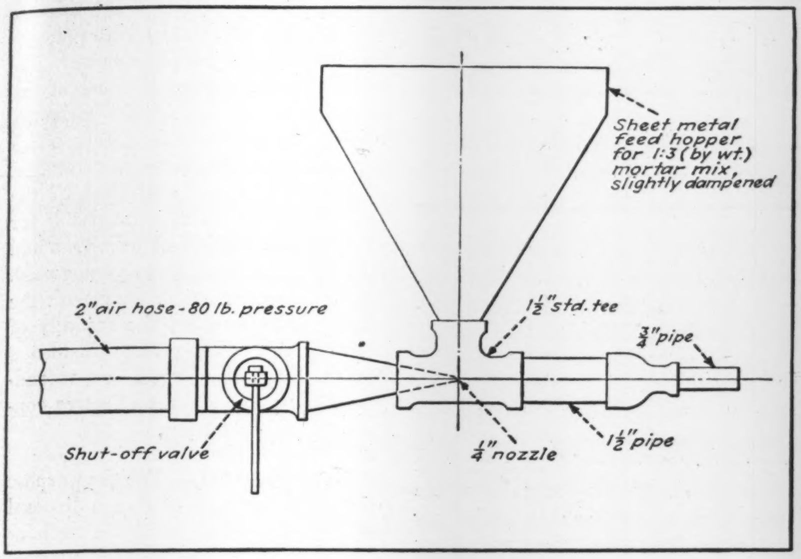
Tremie for Placing Rock

Accurate placement required in dumping gravel and rock in and around type B anchors for the Lake Washington Pontoon Bridge was accomplished with the aid of a metal tube 30 in. in diameter, having a flared or funnel top, and used as shown in the accompanying drawing.

Type B anchors, of which only four are in use, were designed for hard bottom in deep water into which an-



Tube and barge for dumping rock by tremie.


Sheet metal feed hopper for 1:3 (by wt.) mortar mix, slightly dampened
2" air hose - 80 lb. pressure
1½" std. tee
¾" pipe
Shut-off valve
¼" nozzle
1½" pipe

MORTAR GUNS FOR DRY PACKING SMALL PATCHES ON DAMS

A small mortar gun used in "dry packing" small patches in concrete at Pinopolis Dam of the Santee-Cooper power project in South Carolina is shown in the accompanying view. The drawing shows the details of a similar gun used by the U. S. Bureau of Reclamation during the construction of Bartlett Dam on the Salt River Project in Arizona. Where the design originated is not certain. The gun can be made by a mechanic in the shop of a construction job, is easily transported to any point on the job where it is needed and produces much more satisfactory work than can be done by hand patching. A stiff mix of mortar is used to obtain the best results.

chorages could not be jetted or driven. At these points, therefore, large concrete boxes were placed on the lake bottom, filled with sand and gravel and their stability was assured by dumping 900 cu. yd. of rock on the anchor cable side (see *ENR*, July 18, 1940, p. 82).

The rock was brought to the site on barges and then was dumped in accordance with previously set marker buoys. The anchor box was filled with sand and gravel (using the tremie) before the 65,000-lb. pull was applied to the cable. After the cables were under tension, the rock was dumped by scraping it from the barges with a bulldozer into the flared top of the tube. Brackets on the side of the barge steadied the top of the tremie and the telescoping of its two parts compensated for differences in water depths at the several locations. Rock was placed by this method in water more than 165 ft. deep.

Washing Tray for Machine Parts

A portable washing tray with central section part of an old oil drum saves time and patience in machine shops where construction equipment is taken apart and repaired.

This device, which was developed in the contractor's machine shop at Friant Dam in California has been found very useful in repair work on tractors, wagon drills, etc. It consists of one large and two small compartments, usually partly filled with gasoline or some other grease-dissolving, washing fluid, with sloping drain boards around the top on which the parts can be laid for brushing or to dry.

The central compartment is the longitudinal half of a 32-gal. oil drum. At either end are the small compartments about 6x24 in. in plan and 8 in. deep. All compartments have drains controlled by globe valves; ¾-in. pipes drain the smaller end pockets and a 1½-in. pipe leads out of the central section.

The supporting frame is made up of two vertical steel plates ¼ in. thick welded to the ends of the oil barrel and carrying rubber-tired swivel castors at the four corners. The drain boards, with a slope of 1 on 8 at the sides, have stops that prevent machine parts laid thereon from sliding into the containers, but with ports or opening through the stops to allow the liquid to drain back into the tanks.

The device is job-built and was designed by the organization of Griffith Co. and Bent Co., contractors for Friant Dam.

Built around half of an oil drum, this washing tray saves time in the repair and maintenance of construction equipment at the Friant Dam job.

Notes on Sewage Disposal

A monthly summary of current developments conducted by William Rudolfs

MEASURING WORK DONE—To measure the work done by activated sludge and the slime on the stones in trickling filters a number of investigators have attempted to determine the carbon dioxide production; the latter is an end-product of destruction of carbonaceous materials. Depending upon the method of experimentation and the manner of calculation, from 10 to 40 percent of the carbon in sewage mixed with activated sludge is oxidized and recoverable. Statements have been made that the carbon-dioxide retained in trickling filters is a limiting factor for the activities of the organisms. Experiments made by Wilson and McLachlan (*Annual Report,* City of Johannesburg, So. Africa, 1940) on carbon-dioxide production lead them to the conclusion that carbonaceous matter is oxidized to carbon to a much greater extent in filter beds than in the activated sludge process. This would seem to indicate that the stabilization of sewage placed on trickling filters may be considerably greater than in activated sludge.

SANITARY ENGINEERING EDUCATION—During recent years much has been said and written about engineering education. Frequently the question of whether a four-year course of study is sufficient or should be extended to five or more years has been a matter for consideration. More recently we have heard of condensing the studies into three years. Prof. Dunstan of the University of Alabama sent a questionnaire to state sanitary engineers and directors of industrial hygiene and industrial safety to discover their reactions.

Most of the recent discussions on engineering education have indicated the need for greater emphasis on fundamental subjects. The answers stress this point. The need for good expression, both written and oral, received a high rating. While subjects such as English, economics and related fields of study were emphasized, sociology, history and psychology were not given a high rating. It would be expected that applied psychology should be considered a prerequisite since the sanitary and public health engineers must deal with people and one of the frequent criticisms leveled against young engineers (and many older ones) is that they are unable to secure results without arousing animosity. It is possible that the low rating reflects the feeling that ordinary courses in psychology fail to provide much of practical value in dealing with people, rather than that applied psychology is not important. About 55 percent of the replies indicated a belief that a four-year basic course without any specialization was desirable, while the balance expressed preference for a specialized course.

FLIES AND FILTERS—It has been suggested that an increase in flow of sewage over a high-rate trickling filter results in flushing out the beds with subsequent absence of ponding. It has also been suggested that an increased rate of flow results in increased growth of micro-organisms (fly larvae, worms, etc.) until a point is reached where the accumulation of sludge is greater than can be destroyed by the organisms. An increase in rate of flow above this point results in a decrease in population of organisms and is followed by clogging of the bed. Reynoldson (Proceedings Institute of Sewage Purification, England, 1941) studying the biology of the micro-fauna of a high-rate and double-filtration plant, found that in primary beds the variation in organisms was reduced to a few species and the total number decreased. He concludes that high-rate filtration results in the monopoly of one or two species of organisms in the bed. The reduction in organisms is not due to flushing, because the bulk of the solids is in the form of bed growths and sludge depositions. "The very closely adhering mucilaginous fungal and bacterial slimes and the agglutinous sludge are not likely to be washed out by any flushing action of the sewage, which, after all, only trickles downward at a faster rate," he says.

Scientifically controlled use of the scouring organisms appears to be the natural method of controlling ponding and permitting adequate aeration of the bed. Careful control of the rate of flow to render it unsuitable for rapid multiplication of psychoda and still keep the bed open is suggested. The rate of flow will vary with the character of sewage; the rapidity of rotating the sprayer arms is also a factor. Scarcity of food in a secondary filter gives a most effective control to multiplication.

SLUDGE DISPOSAL— For the purpose of comparing costs of sludge disposal at sea with other methods such as digestion and drying or vacuum filtration and incineration West (*Annual Report,* Elizabeth, N. J. Joint Meeting 1940) presents some figures for complete disposal obtained during the year. The plant treats an average of 28 mgd of sewage with a total annual sludge production of 80,545 tons. After storage and concentration the sludge had an average solids content of 8 percent. The cost for total disposal (which includes dock and wharfage fees, overtime charges, labor, power, city water and the unit price per ton of sludge barged to sea) was $4 per ton of dry solids. Beginning June 1, 1941, for the next 4 years the cost per ton wet sludge for barging will be 9 cents higher, causing an increase of about 25 percent in sludge disposal costs.

FILTER CLOTH—The type of filter cloth used on vacuum filters is of great importance and is usually determined by experiments at each plant. Cotton cloth has been used at Cleveland with satisfactory results (Flowers and Gerdel, Annual Report, Ohio Conference on Sewage Treatments, 1940). Because of the possibility of using ferric chloride alone as a conditioning agent for sludge, wool cloth was furnished, but it was soon found that when lime and ferric chloride were used the operating life of the cloth was not commensurate with the cost. Wool cloth should last 10 times longer than cotton at prevailing prices. Experiments with wire filter cloth were highly unsatisfactory, because of difficulties in removing the cake from the filter medium.

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CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

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BROOKLYN-BATTERY TUNNEL, N. Y.

OWNER: New York City Tunnel Authority, 200 Madison Ave., New York, N. Y.

PROJECT: Construction of two 31-ft. tunnels under Hamilton Ave., Brooklyn, and under Buttermilk Channel, New York, N. Y. (Contract 5), To be driven from shafts under construction in Brooklyn; to be generally excavated by use of shields under compressed air; and run from Brooklyn Shaft to Governors Island Shaft. Includes placing of heavy cast iron lining; placing of concrete lining inside cast iron lining under this contract, and inside light cast iron or structural steel tunnel lining in another part of tunnel immediately north of present work; completion of Brooklyn Construction Shaft, including permanent roofs and backfilling; removal of temporary blanket in Buttermilk Channel; maintenance of street and river traffic; temporary water pipe and electric cable lines; protection of buildings adjacent to work; removing existing sewers and constructing new ones; restoration of surface, subsurface and submarine facilities affected by work; placing of temporary and permanent street paving; and remove existing field office building from Long Island City and erect on new site near Brooklyn Construction Shafts.

CONDITIONS: Tunnel Authority to furnish heavy cast iron tunnel lining and ceiling tile. Contractor to furnish all other materials. In addition, contractor is required to furnish bolts, nuts and washers for Contract 6, Manhattan Tunnels. Rail, street and water transportation facilities available. Time for completion 40 calendar months. Wage rates specified in free air are: skilled labor, $1.25 to $2.25 per hr.; semi-skilled, 91⅞c. to $1.50; and common, 87½c. In compressed air up to 18-lb. pressure rates are from $10.00 to $12.50 per day. Divers' rate is $14.00 per day.

BIDS: Five bids were received May 27, 1941, ranging from the contract low of $13,888,851 to $18,318,121.

LIST OF BIDDERS:

1. George H. Flinn Corp., New York, N. Y. (contract)	$13,888,851
2. S. A. Healy Co., Inc., White Plains, N. Y.	14,399,891
3. Rosoff Tunnel Corp., New York, N. Y.	15,794,810
4. Mason & Hanger Co., Inc., New York, N. Y.	17,307,953
5. Associated Contractors, Inc., and Pleasantville Constructors, Inc., Long Island City, N. Y.	18,318,121

Item	Quan.	UNIT PRICES		
		(1)	(2)	(3)
1. Trench excav., earth, sewers, manholes, etc., incl. disposal	5,000 c. y.	$25.00	$11.50	$25.00
2. Tunnel excav., earth; east and west tunnels, incl. disposal (S. of Sta. 77+65 E. tun.; S. of Sta. 78+75 W. tun.)	138,600 c. y.	41.60	57.00	60.00
3. Tunnel excav., mixed face; as above	20,000 c. y.	76.40	73.00	80.00
4. Tunnel excavation, rock; as above	3,200 c. y.	44.40	53.00	60.00
5. Tunnel excav., rock; E. and W. tunnels, north of stations noted above	24,700 c. y.	22.25	15.50	12.00
6. Tunnel timbering	6 M bm.	100.00	100.00	100.00
7. Steel supports	15 ton	100.00	100.00	100.00
8. Furnish, install, maintain and remove temp. 10-in. c. i. water main	L.S.	180,000.00	54,000.00	50,000.00
9. As above, four-conductor cable	L.S.	120,000.00	37,000.00	30,000.00
10. Cement used in concrete	72,500 bbl.	2.00	2.45	3.00
11. Concrete, excl. cem., inside hvy. c. i. tunnel lining	32,500 c. y.	28.90	30.00	30.00
12. Conc., lt. c. i. or str. steel lining (and inside cross passage and trans'n. ring)	14,100 c. y.	28.90	30.00	30.00
13. Conc., in cradles for shields	300 c. y.	29.40	30.00	40.00
14. All other concrete	1,300 c. y.	21.40	30.00	25.00
15. Brick masonry, in place	10 c. y.	60.00	36.50	50.00
16. Hollow terra cotta tile masonry	5 c. y.	60.00	35.00	50.00
17. Neat portland cem. grout, ejected thru c. i. tun. lining or conn. rings; not in comp. air	10 bbl.	15.00	8.00	6.00
18. Neat port. cem., eject. thru tunl. lining, placed in comp. air	90 bbl.	17.00	10.00	10.00
19. For 1:1 neat port. cem. as in No. 17 above	1,500 bbl.	13.00	5.00	6.00
20. For 1:1 neat port. cem., as in No. 18 above	19,100 bbl.	17.00	6.00	7.00
21. Pea gravel eject. thru. tun. lining, not in compressed air	250 c. y.	12.00	18.00	8.00
22. Pea gravel, as above, in comp. air	6,150 c. y.	17.50	20.00	10.00
23. Str. steel, except elsewhere provided for	1,380 ton	140.00	100.00	120.00
24. Connecting rings betw. hvy. c. i. tunl. lining and Brklyn. const. shafts	20 ton	900.00	440.00	500.00
25. Miscellaneous galv. steel	800 lb.	.30	.22	.40
26. Misc. steel, not galv	44,000 lb.	.18	.19	.30
27. Misc. galvanized wrought iron	3,300 lb.	.21	.24	.50
28. Miscellaneous malleable iron	800 lb.	.30	.45	.70
29. Cast iron castings	10 ton	400.00	335.00	400.00
30. Cast steel castings	3 ton	500.00	400.00	600.00
31. Steel reinforcement bars	650 ton	150.00	110.00	120.00
32. Wire mesh for reinf. conc. (not in No. 33 and 34)	363,000 lb.	.14	.11	.10
33. Wire mesh for beam wrapper	400 lb.	.30	.14	.35
34. Wire mesh at flanges, and stiffeners of str. steel tun. lining	34,400 lb.	.22	.16	.20
35. Furn., set steel curbs, with anchorages	15,360 l. f.	5.00	3.30	3.50
36. 1¾-in. bolts, hvy. c. i. tunnel lining	304,400 ea.	1.50	1.50	1.25
37. Furn. and deliver 1¾-in. bolts	20,000 ea.	1.50	1.00	1.50
38. Permanent steel tie-rod units	365 ea.	200.00	150.00	130.00
39. Type A ceiling hanger unit, hvy. c. i. tun. lining	515 ea.	42.00	42.00	50.00
40. Types B or C ceil. hanger units, lt. c. i. lining or str. steel lining	215 ea.	44.00	44.00	55.00
41. Erect. heavy c. i. lining, str. and taper rings, excl. bolts, nuts and washers	2,100 ea.	600.00	410.00	727.00
42. One-ply waterproofing	400 s. y.	.65	.40	.60
43. Waterproofing, brick in asph. mastic	30 c. y.	60.00	33.00	40.00
44. Inst. 4¼x4¼-in. ceramic ceiling tile (no gripper)	166,300 s. f.	.80	.42	.50
45. Inst. 6x6-in. glass ceil. tile with grippers	165,000 s. f.	.65	.27	.35
46. Glazed arhitect. terra cotta	43,400 s. f.	1.60	1.90	2.00
47. 6-in. cast iron bell and spigot cem. lined pipe	7,400 l. f.	3.50	1.72	2.00
48. 6-in. c. i. flanged cem. lined pipe	320 l. f.	6.50	2.83	4.50
49. 12-in. vitr. pipe sewer, incl. cradle	290 l. f.	6.50	5.40	8.00
50. 18-in. vitr. pipe sewer, incl. cradle	300 l. f.	10.00	3.15	10.00
51. 24-in. vitr. pipe sewer, incl. cradle	70 l. f.	16.00	4.50	15.00
52. Flat top rein. conc. sew, egg-shaped invert (5′ 9″ by 3′ 10″)	125 l. f.	50.00	24.00	30.00
53. As above, circular invert (6x6-ft.)	255 l. f.	55.00	30.00	40.00
54. As above, barge-shaped invert (6x7½-ft.)	400 l. f.	65.00	34.00	50.00
55. Vit. pipe spurs for vit. pipe sewers	35 ea.	5.00	4.50	5.00
56. Cast iron spurs for rein. conc. sewers	55 ea.	5.00	23.00	7.00
57. Vitr. brick manhole linings, vit. sewer	10 s. y.	7.00	3.35	10.00
58. Plastering in manholes, vit. pipe sew	80 s. y.	5.00	.60	3.00
59. House sewers, all sizes, incl. cradles, etc.	500 l. f.	5.00	15.50	15.00
60. Remove exist. sewer, Hamilton Ave.	L.S.	150,000.00	40,000.00	50,000.00
61. Part removal exist. Carroll St. sewer	L.S.	40,000.00	1,600.00	10,000.00
62. Inst. galv. c. i. boxes, types CQ, CR, CS, CU	17,000 lb.	.30	.50	.70
63. As above, types CT, CV, CW	35,000 lb.	.30	.58	.80
64. As above, types CL, CP	68,000 lb.	.30	.55	1.00
65. 1-in. silicon bronze tubing	1,600 l. f.	1.10	1.75	1.50
66. 1¼-in. silicon bronze tubing	3,100 l. f.	1.50	2.00	2.50
67. 1½-in. silicon bronze tubing	540 l. f.	2.50	2.25	3.00
68. 2-in. asbestos cem. conduit	13,700 l. f.	.50	.56	1.00
69. 2½-in. asbestos cem. conduit	7,600 l. f.	.65	.56	1.20
70. 3-in. asbestos cem. conduit	30,500 l. f.	.80	.56	1.30
71. 4½-in. asbestos cem. conduit	400 l. f.	1.00	1.00	2.00
72. 4½-in. galv. steel conduit	500 l. f.	2.20	3.50	3.00
73. 4¼-in. single-way vitr. clay tunnel ducts	44,000 d. f.	.40	.37	.40
74. 3½-in. nine-way vitr. clay tunnel ducts	67,000 d. f.	.30	.56	.30
75. Restore sh. asph. pavmt. betw. curb lines	500 s. y.	3.00	4.00	5.00
76. Restore gran. block pavmt. betw. curb lines	400 s. y.	7.00	11.50	6.00
77. Restore gran. headers, incl. cradles	30 l. f.	1.50	2.00	5.00
78. Furn., lay, maintain temp. roadway pavement	1,000 s. y.	2.00	2.00	5.00
79. Furn., inst. timbers for supporting sewer, except piles	50 M bm.	125.00	100.00	100.00
80. Timber piles for supporting sewers	12,500 l. f.	1.50	.75	3.00
81. Miscellaneous copper	4,000 lb.	1.65	.60	.80
82. Miscellaneous brass	5,600 lb.	1.65	.60	1.00
83. Miscellaneous bronze	200 lb.	2.30	.60	1.00
84. Misc. silicon bronze stud bolts and nuts	50 lb.	2.30	1.00	1.20
85. Galv. c. i. boxes, air measur. apparatus	520 lb.	1.25	1.00	1.00
86. Fresh air flues, types SW and OSW	1,188 ea.	75.00	55.00	50.00
87. Exhaust air ports, types 6WA, 6WB, 6WC, for ceramic or glass tile	284 ea.	75.00	100.00	50.00
88. As above, types 6N (D & E) for ceramic tile and 6ND, E, F, & G for glass tile	448 ea.	75.00	90.00	50.00
89. As above, type 5NF ceramic, or type 5NH for glass	178 ea.	75.00	90.00	50.00
90. As above, type 4NG ceramic, 4NJ glass.	120 ea.	75.00	70.00	50.00
91. As above, type 3NH ceramic, 3NK glass tile	168 ea.	75.00	60.00	50.00
92. Restore overhd. trolley railroad	1,000 l. f.	20.00	12.00	3.00
93. Maintain, protecting and underpinning, etc., various blds., Hamilton Ave.	L.S.	174,000.00	26,000.00	90,015.00
94. Maintain, protect, etc., new bldg. on Summit St.	L.S.	20,000.00	5,000.00	20,000.00
95. Remove, re-erect exist. field office	L.S.	35,000.00	17,500.00	50,000.00
96. Ceil. hanger units, type D, Bklyn. Constr. Shaft	4 ea.	70.00	63.00	70.00

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HYATT

ROLLER BEARINGS

QUIET

MATERIALS AND LABOR PRICES

Market quotations on construction materials and wage rates reported monthly by ENR correspondents

SKILLED and common labor rate gains, though not as widespread as in the past two months, continue to be the most important change in the material and labor price list. Bricklayers' rates are up 15c. from the $1.75 per hour rate in Pittsburgh, and up 12½c. from the $1.37½ level in Minneapolis. Structural iron-workers' new wage is $1.75 per hour in Pittsburgh, an increase of 25c. Common labor on heavy construction and on buildings formerly ranged from 60 to 85c. in Boston, but the gap has been closed, and the higher rate now prevails.

Minor gains in lumber prices ranging from 50c. to $2.00 are reported in Birmingham, Chicago, Cleveland and Minneapolis. Cement is up 29c. per barrel in Cleveland, and gravel and crushed stone are 5 and 10c. higher there. Ready-mixed concrete is up 25c. per cu. yd. in Baltimore, Boston and New York; up 75c. in Cleveland; and 10c. higher in Cincinnati. Paving brick increased in Boston and Cleveland; and paving asphalt is $1.00 higher in Philadelphia.

Structural steel shapes are up in Kansas City and San Francisco, and reinforcing bars increased in Boston. Vitrified sewer pipe rose in Cincinnati, Cleveland, Minneapolis and New York.

CEMENT, AGGREGATES, READY-MIXED CONCRETE—F.O.B. CITY

	PORTLAND CEMENT Per bbl., carload lots, including 40c per bbl. for bags, cash discount not deducted			SAND AND GRAVEL Per ton, carload lots			CRUSHED STONE Per ton, carload lots		CRUSHED SLAG Per ton, carload lots, f.o.b. plant		CONCRETE Ready Mixed 1:2:4, 50 c.y. or more, delivered
	Cloth Bags *a*	Paper Bags	Bulk	Gravel, 1½ in.	Gravel, ¾ in.	Sand	1½ in.	¾ in.	1½ in.	¾ in.	
Atlanta	$2.90	$2.66	$2.61	$1.75	$1.85	$1.95	$1.75	$1.85	$1.55	$1.65	$7.90
Baltimore	2.36	2.11	1.91	1.75‡	1.75‡	1.25‡	1.75‡	1.75‡	1.75‡	1.75‡	7.00
Birmingham	2.50	2.25	2.05	1.75	1.75	1.50	1.00	1.00	.90	1.15	5.80
Boston	2.75*b*	2.50*b*	2.30	1.40‡	1.40‡	1.00‡	1.40‡	1.40‡	....	....	7.00*m*
Chicago	2.60	2.35	2.20	2.00‡*d*	2.00‡*d*	2.00‡*d*	2.00‡*d*	2.00‡*d*	1.25‡	1.25‡	....
Cincinnati	2.31	2.06	1.81	1.20	1.20	1.10	1.80	1.80	....	....	6.60
Cleveland	2.29	2.04	....	1.50*i*	1.50*i*	1.30*i*	1.90*i*	1.90*i*	1.70*i*	1.70*i*	7.30*i*
Dallas	2.47	2.22	2.02	1.75*p*	2.00*p*	1.25*p*	1.69*p*	1.84*p*	....	....	6.20
Denver	3.08	2.83	....	1.20	1.40	.90	....	....	....	....	7.25
Detroit	2.24	1.99	1.79	1.31	1.41	.91	1.50	1.50	1.65‡	1.65‡	6.50
Kansas City	2.56	2.31	2.16	1.85	2.30	1.00	1.91	1.91	....	....	7.25*n*
Los Angeles	2.25*b*	2.05*b*	....	1.00	1.00	1.00	1.00*f*	1.00*f*	....	....	5.85
Minneapolis	2.90	2.65	....	1.00*h*	1.00*h*	.25*h*	1.00*h*	1.00*h*	....	....	7.35*j*
Montreal	....	1.95*rs*	1.79*rs*	....	....	1.25‡*t*	.85‡*ct*	1.00‡*ct*	....	....	6.45*ls*
New Orleans	2.41	2.16	1.96	1.50	1.50	1.25	....	....	....	....	7.25
New York	2.55‡	2.30‡	....	1.50*de*	1.50*de*	.90*de*	1.65*de*	1.75*de*	....	....	6.75
Philadelphia	2.32	2.07	1.87	1.55‡	1.65‡	1.35‡	....	....	1.00	1.00	7.95*k*
Pittsburgh	2.44	2.19	1.99	1.40‡	1.40‡	1.70‡	2.25‡	2.25‡	1.50	1.50	7.50
St. Louis	2.55	2.30	....	1.50‡	1.50‡	1.25/1.50‡	1.10*h*	1.10*h*	.75*g*	.75*g*	7.75
San Francisco	2.16	1.96	1.66	1.36	1.36	1.36	1.46	1.46	....	....	6.95
Seattle	2.95*o*	2.70*o*	....	1.00*o*	1.00*o*	1.00*o*	2.00*o*	2.00*o*	....	....	7.25

‡ Delivered. *a* 10c. allowed for each returnable bag. *b* 10c. per bbl. off for cash. *c* Plus municipal tax. *d* Per cu. yd. *e* Barge lots alongside docks. *f* Crushed granite. *g* F.o.b. Granite City. Ill. *h* F.o.b. plant. *i* Within three miles of Public Square. *j* 5% discount for cash. *k* Discount 35c. 500 to 2000; 70c. 2000 to 5000; 95c. over 5000. *l* Up to 200cu. yd. *m* 50c. off for cash. *n* 25 c.y. or more. *o* 2% off for cash. *p* 10c. per ton off, cash 15 days. *r* 10c. per bbl. off, cash 20 days. *s* 8% sales tax included. *t* 8% sales tax not included.

CASH DISCOUNTS CEMENT to Contractors: truck delivery. 2% for cash on 10th of month; on carload deliveries, no trucking, same as dealer cash discount 10c. per bbl. for payment within 15 days of date of invoice. Subject discount 10c per bbl. 20 days in Montreal.

CURRENT MAXIMUM PRICES RECEIVED AT CEMENT MILL

Charge for bags not included. For cloth bags, add 40c. per bbl.; 10c. refund allowed for each returnable bag; for paper bags add 15c. per bbl., not refundable.

	Bagged	Bulk		Bagged	Bulk		Bagged	Bulk
Buffington, Ind.	$1.70	$1.65	Ironton, Ohio	$1.60	$1.55	Richard City, Tenn.	$1.80	$1 75
Dallas, Tex. (Inc. 10c. tax)	1.85	1.80	Limedale, Ind.	1.70	1.65	Steelton, Minn.	1.80	1.75
Hannibal, Mo.	1.70	1.65	Norfolk, Va.	1.65	1.60	Universal, Pa.	1.65	1.60
Hudson, N. Y.	1.75	1.70	Northampton, Pa.	1.55	1.50	Waco, Tex. (10c. tax in Tex.)	1.75	1.70
Independence, Kans.	1.70	1.65	North Birmingham, Ala.	1.70	1.65	Montreal (8% sales tax incl.).	1.68	1.67

PAVING BRICK, BLOCKS, ASPHALT, ROAD OILS—F.O.B. CITY

	PAVING BRICKS AND BLOCKS			PAVING ASPHALT Per ton, less than 80 penetration		ASPHALT BINDERS—FLUXES Per gal., 80-300 penetration		CUTBACK ASPHALT Per ton		ROAD OILS Per gal.	ASPHALT EMULSION (Quick-breaking) Per gal.	
	Granite per M. lots of 50.000 4x4x8 in.	Brick per M. 3x4x8½ in. carload lots	Wood per sq. yd. 3½ in. 16-lb. treat	Tank car	Drums	Tank car	Drums	Tank car	Drums	Tank car	Tank car	Drums
Atlanta	$73.00	$39.35	$2.25	$17.30*e*	$23.83*e*	$0.0695*e*	$0.1018*e*	$0.0734*he*	$0.1257*h*	$0.0634*e*	$0.0734	$0.1257
Baltimore	165.00‡	45.00‡	2.90	14.00	20.00	.06	.09	.065*h*	.115*h*	......	......	......
Birmingham	......	27.50*j*‡	....	18.20	23.20	.0747	.1047	.0834*h*	.1484*h*	......	......	......
Boston	95.00	48.50	3.50	14.00	20.00	.06	.09	.065*h*	.115*h*	.065	.09‡	.12‡
Chicago	150.00	50.00	1.85*d*	14.50	18.50	13.00*g*	17.00*g*	.06*h*	.10*h*	.05	.095	.13
Cincinnati	112.00	37.50	....	14.00	18.00	.08	......	16.80	......	.0625	......	.085
Cleveland	110.00	39.00	2.25	15.00	20.00	.07	.08	.08*h*	.09*h*	.035	.08	.09
Dallas	......	30.00	....	13.25	20.30	.06	.103	15.00	24.80	.055	.05/.07	.07/.09
Denver	......	27.50	....	....	.....	......	......	......	......	......	......	......
Detroit	......	35.00	....	14.10*f*	19.00*f*	.061	.1025	14.10	18.60	.0425	.0645	.098
Kansas City	......	40.00	....	18.50	23.50	.077	.1075	.077*h*	.107*h*	.057	.11	.15
Los Angeles	......	50.00	....	6.50*b*	15.00	6.50*bg*	15.00*bg*	5.50*b*	......	.0192	.0525	.1125
Minneapolis	......	......	1.90*d*	21.20	25.70	.10	.12	19.00	29.50	.06	......	......
Montreal	75.00*k*	......	3.62*k*	16.60*k*	24.25*k*	.116*k*	.1485*k*	.115*hk*	.135*hk*	.08*k*	.135*k*	.188*k*
New Orleans	......	......	....	14.00*a*	19.00*a*	.055	.085	.06*h*	.09*h*	......	.078	......
New York	......	......	2.90	15.00	21.00	.06	.09	.065*h*	.115*h*	......	......	......
Philadelphia	120.00	42.50	2.84	15.00	22.00	.06	.12	.07*h*	.13*h*	.06	.07	.13
Pittsburgh	135.00	38.75	....	.....	.....	......	......	......	......	......	......	......
St. Louis	115.00/125.00	37.00	....	14.00	19.00	14.00*g*	19.00*g*	.06*h*	.095*h*	.04	.09	.125
San Francisco	......	70.00	....	6.50	15.00	6.50*g*	15.00*g*	7.00	17.50	.025	.0525	.1125
Seattle	......	60.00*c*	....	15.70	24.10	......	24.10*g*	10.50/11.50	24.00/25.00	8.75*g*	.0575*i*	.1308*i*

‡ Delivered. *a* F.o.b. Baton Rouge. *b* Delivered to purchaser's warehouse. *c* 3½x4x8½ in. *d* 2½ in. 6 to 8-lb. treatment. *e* Local reduction due to 20% reduction intra-state class freight rates, only Georgia affected. *f* Mexican *g* Per ton. *h* Per gallon. *i* F.o.b. Martinez. *j* 3x3⅝x8½ in. *k* tax included.

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for pencil and ink

PHOENIX DEFIES MOISTURE GHOSTS

Perspiration and water splashes on ordinary tracing cloth create "ghosts" which reproduce on blueprints. PHOENIX Tracing Cloth withstands actual immersion in water for fully 10 minutes at a time! *Perspiration and water marks will not stain it!*

PHOENIX LESSENS SMUDGE GHOSTS

The new improved surface of PHOENIX Tracing Cloth permits you to use harder pencils (5H and 6H) and to get sharper lines with less tendency to smudge.

Result: Cleaner tracings and blueprints.

PHOENIX REDUCES ERASURE GHOSTS

Ordinary tracing cloths become scarred when erased... erased spots produce ghosts on blueprints.

PHOENIX has a durable drawing surface that reduces working scars to a minimum.

IRON AND STEEL PRODUCTS—BASE MILL PRICES

	STRUCT. SHAPES-PLATE	REINF. BARS ¾-in. billet *b*	RIVETS ¾-in. structural	WIRE NAILS Base *d*	SHEET PILING Base	STEEL RAILS Per Gross Ton Standard	Light	Re-rolled	TRACK SUPPLIES Angle Bars	Std. Spikes *c*	Tie Plates *c*	Track Bolts
Birmingham	$2.10	$2.15	$3.75	$2.55	.....	$40.00	$40.00	$39.00	$2.70	$3.00	$2.15	$4.15
Chicago	2.10	2.15	3.75	2.55	$2.40	40.00	40.00	39.00	2.70	3.00	2.15	4.15
Pittsburgh	2.10	2.15	3.75	2.55	2.40	40.00	40.00	39.00	2.70	3.00	2.15	4.15
Buffalo	2.10	2.15	.....	.....	2.40	.....	.....	.....	.....	.....	2.15	.....
Cleveland	2.10	2.15	3.75	2.55	.....	.....	.....	.....	.....	.....	.....	.....
Youngstown	.....	2.15	.....	.....	.....	.....	.....	.....	.....	3.00	.....	.....
Detroit	.....	2.25‡	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Gulf ports	2.45*a*	2.50*a*	.....	.....	2.85*a*	.....	.....	.....	.....	.....	.....	.....
Pacific ports	2.75*a*	2.60*a*	.....	.....	2.95*a*	.....	.....	.....	.....	.....	2.30	.....

‡ Delivered. *a* F.o.b. cars dock. *b* Rail steel same as billet prices. *c* Other basing points include Portsmouth, O., Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., and Pacific coast ports, on tie plates, alone, Steelton, Pa., on spikes alone, Lebanon, Pa., Richmond, Va. *d* Add switching charge $18 per c.l.

IRON AND STEEL PRODUCTS—F.O.B. WAREHOUSE, PER 100 LB., BASE PRICE

	STRUCTURAL SHAPES Per 100 lb. base price	REINFORCING BARS* Per 100 lb., ¾ in., base price 15 tons or over *b* New billet	Rail steel	Add Switch	$/cwt. for Del.	EXPANDED METAL LATH Per 100 sq.yd., carload lots Std. diamond mesh, 3.4 lb.	Std. ribbed 3.4 lb.	WELDED FABRIC REINFORCING Per 100 s.f., carload lots 4x16 in., No. 5 & 10 wires	4x12 in., No. 8 & 12 wires	6x6 in. No. 6 & 6 wires Per sq. yd.	SHEET PILING Per 100 lb. base price
Atlanta	$2.34	$2.39	$2.39	.02½	.10	$21.00	$23.00	$1.82	$1.35	$0.1719	$3.04
Baltimore	3.70	2.90	2.75	......	.10	28.00	29.50	1.70	1.27	.1611	3.00
Birmingham	2.10*a*	2.15	2.15	.02½	.10	19.00	22.50	1.80	1.34	.1701	....
Boston	3.75	3.11	3.01	$20 C.L.	.10	16.50	18.50	1.76	1.31	.1656	2.77
Chicago	2.10*a*	2.15	2.05	.03	.05	20.50	22.50	1.67	1.25	.1575	2.40
Cincinnati	3.68	2.51*cd*	2.41*cd*	......	.05	19.00	21.00	1.66	1.25	.1566	....
Cleveland	3.58*g*	2.15	2.15	.02½	.10	19.50	21.50	1.66	1.25	.1566	....
Dallas	5.30	3.95	3.95	......	.....	23.50	25.50	1.93	1.42	.1827	....
Denver	4.35	3.95	3.80	......	.....	24.50	26.50	1.97	1.45	.1863	....
Detroit	3.65‡	2.25	2.15	......	.10	22.00	24.00	1.68	1.26	.1584	2.66
Kansas City	4.17	2.51*cd*	2.36*cd*	.0	.05	17.50	21.00	1.78	1.33	.1683	2.86
Los Angeles	3.65*f*	2.25	2.10	.02½	.05	23.00	27.50	1.93	1.42	.1827	3.65
Minneapolis	3.80‡	2.48*c*	2.48*c*	.0	.10	21.50/22.50	23.50/24.50	1.80	1.34	.1701	2.73*d*
Montreal	3.90*i*	2.65*i*	2.55*i*	......	.....	26.00*hi*	33.00*hi*	2.58*i*	3.22*i*	.264*i*	2.58*i*
New Orleans	4.40	2.52	2.52	.05	.10	21.50	23.50	1.82	1.35	.1719	2.875
New York	3.75	2.39	2.39	......	.15	18.50	20.50	1.76	1.32	.1665	2.74
Philadelphia	3.75	2.66	2.56	......	......	19.50	21.50	1.71	1.28	.1611	2.72
Pittsburgh	2.10*a*	2.15	2.05	.02½	.10	21.50	24.50	1.59	1.20	.1503	2.40
St. Louis	3.69	2.39	2.39	.0	.05	22.50	26.00	1.69	1.27	.1602	2.70
San Francisco	4.70	2.65	2.50	.02½	.10	19.00	25.50	1.93	1.42	.1827	3.25
Seattle	2.75*e*	2.50*e*	......	......	......	25.50	27.50	1.93	1.42	.1827	2.95*e*

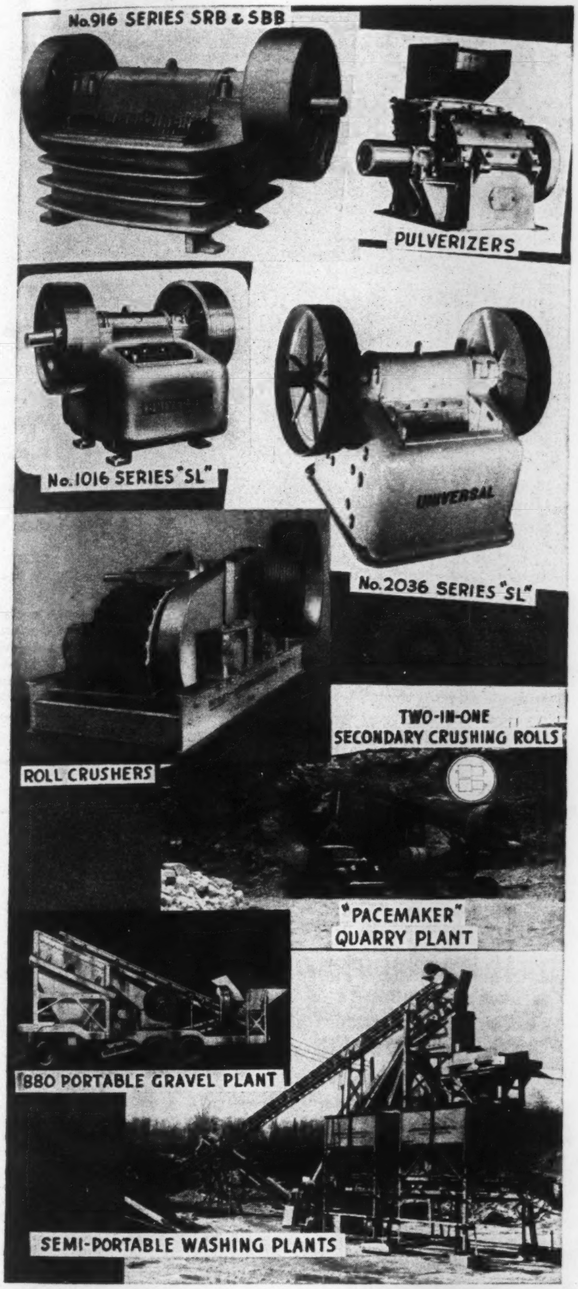
‡ Delivered. *a* Mill prices. *b* 5–15 tons, add 15c. 1–5 tons, add 25c. Less than 1 ton, add 50c. *c* 20 tons or over Base. *d* Mill price plus freight. *e* F.o.b. dock. *f* Includes delivery in free delivery zone. *g* Less than 1 ton, add 25c.; 1 to 5 tons, add 10c. High scrap steel prices cut former 15c. differences between new billet and rail steel in many mills. *h* List price. *i* Plus Dominion and Province sales tax.

PLUMBING, HEATING, WATER, SEWER AND DRAIN PIPE

	C. I. PIPE Per net ton f.o.b. 6 in. to 24 in.*a*	VITRIFIED SEWER PIPE Per foot, std. 8 in., s.s.	delivered std. 12 in., s.s.	ASTM 24 in.,	C13–35 36 in.,	CLAY DRAIN TILE Per 1,000 ft., carload lots, f.o.b. 6 in.	8 in.	CONCRETE SEWER PIPE Per ft., delivered; ASTM 12 in.	C 14–35 24 in.	WROUGHT STEEL PIPE Full standard weight, *h* 1 to 3 in., Butt Weld Black %	Galv. %	3½ to 6 in.; Lap Weld Black %	Galv. %
Atlanta	$49 40	$0.26*b*	$0.468*bc*	$1.8525	$4.68*c*	$85.00	$128.00	$0.45	$1.642	62.2	54.2	59.7	51.2
Baltimore	52.80	.45	.70	2.50	6.90	120.00	160.00	.75	2.00	65.5	57.5	63.0	54.5
Birmingham	45.00	.26	.468	1.7875	4.66	85.00	220.00	.40	1.60	62.2	54.2	59.7	51.2
Boston	55.00	.203	.4455	1.98	5.64	115.50‡	228.50‡	.45	1.69	64.1	56.1	61.6	53.1
Chicago	53.80	.28	.54	2.25	6.25	100.00‡	150.00‡	.38	1.48	67.0	59.0	63.5	55.0
Cincinnati	52.70	.231	.4455	1.80	5.125	105.00	170.00	.60	1.70	65.9	57.9	63.4	54.9
Cleveland	54.24	.196	.378	1.485	4.715	69.00	108.00	.35	1.50	67.8	59.8	65.3	56.8
Dallas	58.20	.28	.504	2.016	4.70	80.00	100.00	.46	1.57	59.9	51.9	57.3	48.3
Denver	60.60	.24†	.52†	2.16†	......	130.00	240.00	....	....	58.4	50.4	55.7	47.2
Detroit	54.24	.245	.4725	1.935	4.408	66.45	105.00	.33	1.50	66.3	58.3	63.8	55.3
Kansas City	55.12	.30	.54	2.16	5.00	120.00	240.00	.45	1.60	62.9	54.9	60.0	51.5
Los Angeles	55.00	.282†	.508†	2.034†	5.085†	115.50	192.50	1.00	2.00	59.6	51.6	57.0	48.6
Minneapolis	57.20	.25†	.45†	1.80 †	4.60†	......	......	.70	1.80	64.2	56.2	60.7	52.2
Montreal	60.00	.55	.90	3.68	5.95*e*	135.00‡	260.00‡	.48*l*	1.92*l*	......	......	......	....
New Orleans	51.38	.26	.48	1.69	......	150.00	220.00	.37	2.10	62.4	54.4	58.8	50.3
New York	52.20	.40	.71	2.75	7.00	......	......	.50	1.20	64.9	56.8	62.4	53.9*i*
Philadelphia	50.90	......	......	......	......	......	......	.54	1.80	65.3	57.3	62.8	54.3
Pittsburgh	55.60	.245†	.4725†	1.845†	5.4325	97.80	154.20	.85*g*	2.00*g*	68.5*i*	57.5*i*	66.0*i*	54.5
St. Louis	52.48	.24	.432	2.016	3.96	85.00	170.00	.75*j*	1.80*k*	65.1	57.1	62.0	53.5
San Francisco	55.00	.3275*d*	.5895*d*	2.358	5.895	107.25	178.75	.54	2.50	45.0	31.0	47.0	34.5
Seattle	55.35	.35	63	2.52	6.30	72.00	175.00	.35*f*	1.30*f*	......	......	......	....

‡ Delivered. † F.o.b. *a* B. & S. class B and heavier, C/L lots, 200 tons and over Burlington, N.J. (base) $49.00. Gas pipe and class A, $3 per ton additional, 4 in., $3 per ton additional, 30 in. and larger usually $2 per ton less. *b* Double strength. *c* List to dealer. *d* List. *e* 30-inch. *f* Less 5% for cash. *g* Culvert pipe. *h* Discounts from standard list consumers carload prices, except Pittsburgh prices are f.o.b. mill. Base price $200 per net ton. List prices per ft.: ½ in., 8½c.; ¾ in., 11½c.; 1 in., 17c.; 2 in., 37c.; 2½ in., 58½c.; 3 in., 76½c.; 4 in., $1.09; 6 in., $1.92. *i* Applies also at Lorain, Ohio, mills. Chicago delivered base is 2½ points less on butt, 1½ on lap. Freight is figured from Pittsburgh, Lorain, O., Chicago Dist. Billing is from point producing lowest price at destination. WROUGHT IRON PIPE: Base price and list prices per ft. same as wrought steel pipe. Discount for Pittsburgh base: Butt-weld—1 in. and 1¼ in. black 34, galv. 16; 1½ in. black 38, galv. 18½; 2 in. black 37½, galv. 18. Lapweld—2½ in. to 3½ in. black 31½, galv. 14½ in.; 4½ in. to 8 in. black, 32½ galv. 17. *j* Reinforced; spec. C 76-37. *k* Reinforced; spec. C 75-37. *l* Plus sales tax.

These times demand UNIVERSAL
CRUSHING EQUIPMENT


No.916 SERIES SRB & SBB
PULVERIZERS
No.1016 SERIES "SL"
UNIVERSAL
No.2036 SERIES "SL"
TWO-IN-ONE SECONDARY CRUSHING ROLLS
ROLL CRUSHERS
"PACEMAKER" QUARRY PLANT
880 PORTABLE GRAVEL PLANT
SEMI-PORTABLE WASHING PLANTS

- There's lots of work to be done in a hurry—training camps, defense projects, new roads and road improvements to handle accelerated traffic, housing projects—it's surely no time to use obsolete equipment and make-shift set-ups.
- "Get in and pitch" with Universal profit-proved equipment. It's geared to the times. There's a Universal Crusher, Pulverizer and Stationary or Portable Plant just suited to your needs that will crush your material any size you want it, wherever you are, faster and at lower cost than any other equipment built to do the job.
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UNIVERSAL

CRUSHERS, PULVERIZERS, COMPLETE PLANTS, SPREADEROLLERS, PORTABLE ASPHALT PLANTS

LUMBER, TIMBER, PLYWOOD—PER M FT., B.M., CARLOAD LOTS F.O.B.

	SHORT LEAF YELLOW PINE AND DOUGLAS FIR All S. L. Y. P. is No. 2 common or better and for No. 1 N. C. Box. (Prices in Bold Face) *All Fir planks No. 2 common, Fir timber is No. 1 common. Lengths up to 20 ft. (Prices in italics)*									LONG LEAF Y. P. Merchantable grade up to 20 ft.		PLYWOOD* Rail freight inc[illegible]men) (See note for bas[illegible] pricet	
	1x6 S4S	1x8 S4S	2x4 S4S	2x6 S4S	2x8 S4S	2x10 S4S	3x12 Rgh	6x12 Rgh	12x12 Rgh	2x12 Rgh	12x12 Rgh	⅝"	
Atlanta	**$21.00**	**$21.00**	**$20.00**	**$21.00**	**$21.50**	**$24.50**	**$27.00**	......	......	$40.00	$50.00	$17.75	$21.60
Baltimore	**41.00**	**42.00**	**40.00**	**41.00**	**41.00**	**44.00**	**55.00**	......	......	85.00	90.00	17.35g	21.15g
	43.00	*43.00*	*43.00*	*43.00*	*44.00*	*45.00*	*55.00*	*$57.00*	*$58.00*	......	......	......	......
Birmingham	**25.50**	**25.50**	**25.00**	**24.50**	**24.00**	**27.50**	**48.00**	**46.00**	**46.00**	......	......	16.25	19.85
[1]	30.00	31.00	30.00	30.00	31.00	37.00	57.50	......	......	53.00	60.00	......	......
Boston	40.00[2]	40.00[2]	40.00[3]	45.00	60.00[1]	65.00[1]	80.00[1]	......	......	80.00	80.00	17.35g	21.15g
	40.00	*40.00*	*40.00*	*45.00*	*45.00*	*45.00*	*50.00*	*50.00*	*55.00*	......	......	......	......
Chicago	**42.00**	**42.00**	**41.00**	**41.00**	**41.00**	**42.50**	**52.50**	......	......	90.00	100.00	13.80	16.80
	40.00	*40.00*	*40.00*	*40.00*	*40.00*	*44.00*	*47.00*	*48.00*	*48.00*	......	......	......	......
Cincinnati	**37.50**	**39.00**	**38.00**	**38.00**	**38.00**	**41.00**	**50.00**	......	......	60.00	63.00	16.25	19.85
	......	......	......	......	......	......	*52.00*	*52.00*	*52.00*	......	......	......	......
Cleveland	**41.00**	**42.00**	**42.00**	**40.00**	**41.00**	**46.00**	**51.00**	51.00	51.00	84.00	84.00	16.70	20.40
Dallas *e*	**38.00**	**39.00**	**38.00**	**36.00**	**37.00**	**38.50**	**52.50**	**52.50**	**52.50**	76.00	81.00	13.90	16.95
Denver ‡	49.00[4]	47.00[4]	50.00[4]	50.00[4]	50.00[4]	52.00[4]	52.00[4]	62.00[4]	65.00[4]	......	......	9.90	12.05
Detroit	**42.50**	**42.50**	**41.00**	**42.50**	**42.50**	**44.50**	**51.00**	......	......	50.00	59.00	16.25	19.85
	......	......	......	......	......	*49.00*	*52.00*	*59.00*	*59.00*	......	......	......	......
Kansas City	**40.00**	**40.00**	**37.00**	**37.00**	**37.00**	**40.00**	**45.00**	......	......	65.00	70.00	12.25	14.95
	42.50	*42.50*	*40.00*	*40.00*	*40.00*	*42.50*	*42.00*	*45.00*	*45.00*	......	......	......	......
Los Angeles *a*	*40.00*	*40.00*	*39.00*	*39.00*	*36.00*	*36.00*	*43.00*	*48.00*	*43.00*	......	......	9.35gh	11.35gh
Minneapolis ‡*b*	40.00[8]	40.00[8]	......	......	......	......	......	......	......	......	......	12.05	14.70
‡	*42.50*	*42.50*	*42.50*	*40.50*	*40.50*	*42.50*	*46.50*	*54.00*	*54.00*	......	......	......	......
Montreal †[7]	*36.00*	*38.00*	*36.00*	*38.00*	*40.00*	46.00	......	......	......	155.00	165.00	......	......
	53.50	*53.50*	*54.25*	*54.25*	*59.25*	*59.25*	*65.00*	*65.00*	*65.00*	......	......	......	......
New Orleans	**24.00**	**25.00**	**25.00**	**24.00**	**24.00**	**25.00**	**46.00**	......	......	62.00	69.00	13.90	16.95
	29.00	*29.00*	*32.00*	*33.00*	*35.00*	*34.00*	*36.00*	......	......	......	......	......	......
New York ‡	**44.00**	**45.00**	**45.00**	**45.00**	**46.00**	**48.00**	**50.00**	......	......	85.00*f*	90.00*f*	17.35g	21.15g
‡	......	......	*54.00*	*54.00*	*54.00*	*54.00*	*56.00*	*60.00*	*60.00*	......	......	......	......
Philadelphia	**24.00**	**24.50**	**25.50**	**25.50**	**27.50**	**27.50**	**29.00**	......	......	50.00	57.50	17.35g	.1512g
	35.00	*36.50*	*39.00*	*38.25*	*29.00*	*39.00*	*44.00*	*32.00*	*32.00*	......	......	......	......
Pittsburgh	**50.80**	**53.20**	**62.75**	**55.00**	**60.85**	**62.50**	**76.25**	......	......	......	......	17.00	20.70
	69.20	*68.10*	*66.10*	*65.30*	*65.20*	*65.65*	*88.75*	*88.75*	*88.75*	......	......	......	......
St. Louis ‡*c*	**38.00**	**39.00**	**37.00**	**36.00**	**37.00**	**39.00**	**52.00**	*58.00*	*58.00*	76.00	75.00	13.90	16.95
San Francisco *d*	*32.00*	*31.00*	*32.00*	*33.50*	*33.00*	*33.50*	*33.50*	*32.00*	*32.00*	......	......	7.30g	8.90g
Seattle	*27.00*	*27.00*	*27.00*	*27.00*	*27.00*	*27.00*	*36.00*	*36.00*	*36.00*	......	......	0.00	0.00

Bold Face type, Southern Pine. *Italics, Douglas Fir.* [1] Long leaf. [2] Roofers' N. C. Pine. [3] Spruce. [4] Native. [6] Western Pine, No. 3 Common. [7] Spruce. [8] Norway Pine. ‡ Delivered. *a* Yard prices. *b* Contractors discount in Minneapolis and St. Paul discontinued May 21, 1938. *c* 5M ft. or less. *d* At ship's tackle. *e* 10% discount taken off. *f* Up to 18 ft. † Plus sales tax.

Note: Special concrete form grade Fir Plywood, 4′ by 8′ panels, 5-ply, sanded 2 sides, water resistant glue, carload lots, delivered per 1,000 sq. ft. surface. Seattle base price on ⅝", $86.50; on ¾", $95.30; price includes oiling and sealing charges. For other centers add rail freight increment from table or proper size. For resin dipped treatment, add $10.50 per M. *Many mills out of market due to rush of defense orders. *g* Lower rate by water shipment. *h* 50,000lb. minimum

GLASS, EXPLOSIVES, CHEMICALS

	WINDOW GLASS Discounts from jobbers list, Aug. 15, 1938 Single or Double Thickness		EXPLOSIVES Per lb. 40% Ammonia Gelatin in 50-lb. cases delivered in 200 lb. lots*
	A quality	B quality	
Atlanta	75%	75%	$0.15
Baltimore	82%	81%	.15
Birmingham	75%	75%	.105
Boston	78%	79%	.15
Chicago	79%	79%	.15
Cincinnati	77%	77%	.15
Cleveland	77%	77%	.19
Dallas	78%	78%	.1625
Denver	77%	77%	.155*e*
Detroit	79–10%	79–10%	.15
Kansas City	77–10%	77–10%	.155
Los Angeles	86%*d*	88%*d*	.1575
Minneapolis	76%	76%	.155
Montreal	40–10%‡	50–5%‡	.155†
New Orleans	70%	75%	.16
New York	81%	82%	.22*f*
Philadelphia	82–10%*d*	83–10%*d*	.15
Pittsburgh	79%	79%	.1225
St. Louis	77–10%	77–10%	.155
San Francisco	78%*d*	83%*d*	.155
Seattle	75%	76%	.1575†

Price of 60% Ammonia Gelatin is $0.015 per lb. higher than 40%

a Disc. from list Sept. 1939. *b* Also less 6% tax exemption. *d* Discount from jobbers' list Sept. 15, 1928. ‡ Plus sales tax.

* Urban prices influenced by service charges or local storage and delivery regulations, do not consistently reflect quantity prices in less congested areas. *e* F.o.b. Louviers, Colo. *f* In boroughs of Kings, Queens and Richmond, and in Manhattan south of Canal Street, add delivery charge of $6.00 per trip. † F.o.b.

40% Ammonia Gelatin price ranges in other than urban areas, per lb.
(except Seismograph Grades)

	C/L 20,000 lb. net	Tons	200 lb. lots
E. of the Miss., except Fla.	$0.105	$0.14	$0.16
W. of Miss. to Rocky Mtn. States, and Fla.	.11 –.1175	.135 –.1475	.155 –.1675
Rocky Mtn. States	.105 –.1325	.125 –.1375‡	.135–.1525‡
Pacific N. W. States	.1075–.12	.1375–.15	.1575–.17
Pacific S. W. States	.1050–.1175	.135 –.1475	.155 –.1625

‡F.o.b. Louviers, Colo., or Butte, Mont.

PILES, TIES—F.O.B.

PILES

Prices per linear foot, pine, with bark on, f.o.b. New York; delivered from barge 1½ to 2c. per ft. additional:

			Short Leaf	
Dimensions	Points	Length	Barge	Rail
12 in. at butt	6 in.	30 to 50 ft.	$0.22	$0.195
12 in.—2 ft. from butt	6 in.	50 to 59 ft.	.26	.24
12 in.—2 ft. from butt	6 in.	60 to 69 ft.	.28	.255
14 in.—2 ft. from butt	6 in.	50 to 69 ft.	.30	.265
14 in.—2 ft. from butt	6 in.	70 to 79 ft.	.36	.275
14 in.—2 ft. from butt	5 in.	80 to 85 ft.	.42	.415
14 in.—2 ft. from butt	5 in.	85 to 89 ft.	.45	.482

RAILWAY TIES

Prices f.o.b., per tie for carload lots:		6"x8"x8′		7"x9"x8′6"	
		Untr.	Tr.	Untr.	Tr.
Boston	Oak	$1.30	....	$1.80	....
	Pine	1.60	$2.40*a*	2.40	$3.40*a*
New York	S. L. Sap Pine	1.20/1.30	1.95	1.60	2.55
	Mixed Oak	1.55	2.05	2.00	2.65
Birmingham	White Oak	.85	1.50*a*	1.35	1.70*a*
	Southern Pine	.55*b*	1.10*ab*	.70	1.30*a*
Chicago	Oak	....	1.65*a*	....	2.25*a*
	Southern Pine	....	1.53*a*	....	2.13*a*
Los Angeles	Douglas Fir	.64	1.38*a*	.90	1.80*a*
Philadelphia	Red Oak	1.10	....	....	2.40*a*
St. Louis	White Oak	1.30	....	1.65	....
	Red Oak	1.30	1.75*a*	1.65	2.25*a*
	Sap Pine or Cypress	1.20	....	1.55	....
San Francisco	Douglas Fir	1.00*bef*	....	....	2.45*caf*
Montreal	Birch or Maple	.65	1.05*a*	.75	1.35*a*

Tr.—Treated; Untr.—Untreated. *a* Creosoted. *b* 6" x 8" x 8′6". *c* Empty cell. *d* Zinc. *e* Green. *f* At ships tackle.

CHEMICALS

Water, sewage treatment, road work, f.o.b. carlots, New York

Bleaching powder, in drums, f.o.b. works, per 100-lb	$2.00–2.85
Chlorine cylinders, liquid, per lb. delivered	.0525
Calcium chloride, 77–80%, flaked, in 400-lb. drums or 100-lb. moisture proof bags, delivered, per ton	20.50–35.00
Silicate of soda, 52 deg., in drums, f.o.b. works, per 100 lb	1.40
Soda ash, 58%, in paper bags, per 100 lb. dense	1.10
Sulphate of aluminum, commercial, in 100-lb. bags, per ton	23.00
Sulphate of copper, in bbl., per 100-lb	4.75

MAKE THE MOST OF YOUR MANPOWER!
WITH Thor CLAY DIGGERS

These THOR Features Make the Dirt Fly Faster!

New Cylindrical Rocker Valve
Pigtail Rubber Bumper
Extra Hitting Power
Smoother Operation
Quick Starting in Any Position

Why make muscles do the job that THOR clay diggers can do so much surer and faster! Make the most of your manpower with these hard hitting, smooth handling tools that perform a multitude of digging jobs in a fraction of the time consumed by hand methods.

Responsible for this top notch performance of THOR clay diggers is an outstanding group of construction features. The new THOR Cylindrical Rocker Valve insures a powerful blow and low air consumption. The THOR Pigtail Rubber Bumper absorbs vibration, keeps out dirt and grit. The THOR Self-Seating Throttle Valve insures positive "full off" and "full on" position, prevents air leakage.

These and other important features are available in a complete line of THOR clay and trench diggers, in six different models for light and heavy duty. For full details, mail the coupon for new THOR catalog No. 42.

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STRUCTURAL CLAY BUILDING TILE, BRICK AND LIME—DELIVERED

	STRUCTURAL CLAY TILE — PARTITION — SCORED Per M. lots of 2,000 pieces or over, 3x12x12 in.	4x12x12 in.	8x12x12 in.	STRUCTURAL CLAY TILE — LOAD BEARING — SCORED Per M. lots of 2,000 pieces or over, 8x12x12 in.	10x12x12 in.	12x12x12 in.	BRICK Per M. in quantity. Common backing	Straight hard	LIME Per ton, Hydrated finishing	In paper, Common hydrated	Carload lo Pulverized or lump
Atlanta	$90.00	$100.00	$185.00	$220.00	$230.00	$240.00	$13.00	$18.00	$26.50	$17.00	$17.00
Baltimore	80.00	85.00	160.00	190.00	240.00	295.00	14.00k	17.00k	19.00	16.00	2.50
Birmingham	80.00	85.00	160.00	191.00	252.00	285.00	14.00	17.00	18.11	12.64	1.66
Boston	98.70a	105.30a	206.85a	236.15	310.85a	346.00a	17.00i	20.00i	19.50	14.91	17.50
Chicago	68.10	72.60	135.90	185.70	234.90	268.10	11.50	12.50	16.40	14.40	12.20
Cincinnati	62.40	66.50	124.75	149.70	187.90	214.75	16.00	16.00	15.40	12.90	......
Cleveland	56.50	60.00	112.50	135.00	182.00	209.00	16.00	16.00	15.00j	12.00j	2.75jm
Dallas	50.00	52.00	100.00	135.00	200.00	250.00	11.50i	13.50i	19.00	15.00	.95n
Denver	84.80	94.40	152.70	178.20	212.00	227.90	13.50	17.00	30.00j	19.00j	30.00
Detroit	69.00	73.60	138.00	176.00	232.00	265.00e	16.50	17.00	16.50	13.90	14.90
Kansas City	64.50	66.50	86.00c	125.50	159.75	186.25	15.50	24.00	19.10	12.80	10.70
Los Angeles	73.50†r	89.50†r	128.00c†r	210.00†r	368.00†r	460.00†r	13.50	15.00	16.50	17.50	17.50
Minneapolis	71.45	76.20	143.95	171.45	173.80	242.10	13.10	15.10g	21.00	16.00	19.00
Montreal	72.20au	77.50au	142.50au	76.00atu	165.80au	248.70u	17.50†u	24.25†u	23.50u	17.00u	12.00u
New Orleans	72.00	72.00	135.00	162.00	210.00	260.00	14.00	......	18.30	12.08	14.10
New York	78.40	83.60	115.00c	193.30h	238.80h	295.60h	13.50	......	19.00	14.00	17.00
Philadelphia	80.50	85.90	161.10	193.30	238.80	295.60	17.00s	19.00s	15.70q	10.05q	12.05q
Pittsburgh	58.40	62.40	116.85	124.00	153.00	193.75	17.50	25.00	17.90	15.40	2.55m
St. Louis	62.00	88.00	120.00	180.00	234.00	280.00	17.00	18.00	22.00	16.00	2.30lm
San Francisco	84.00	94.50	225.00	......	......	......	14.00	17.00	.75o	2.05o	16.40
Seattle	100.00	110.00	220.00	......	......	......	18.00f	22.00f	20.00s	20.00s	20.00s

† F.o.b. *a* Smooth. *b* Carload lots delivered to job. *c* 6x12x12 in. *d* Not load bearing. *e* 48 lb. tile. *f* Less $1.00, ½ cash 15 days, balance 30 days. *g* Selected common. *h* F.o.b. Perth Amboy, N. J. *i* 50c. per M. off for cash.

j LCL. *k* $1.00 discount if paid in 10 days. *l* Lump. *m* Per bbl., 180 lb. *n* Per sack 100 lb. *o* Per bbl., 200 lb. *p* 280 lb. bag. *q* 25-ton cars. *r* 5% discount 10 days. *s* 2% off cash. *t* 5½ x 8 x 12. *u* Plus 8% sales tax.

PAINT, ROOFING—F.O.B. CARLOAD LOTS

	RED LEAD Per 100 lb. in 600-lb. (Approx.) bbl. Dry *a*	WHITE LEAD Per 100 lb. in oil	READY-MIXED PAINT Per gal., drums Graphite *b*	Aluminum *c*	Ferric Oxide *d*	ROOFING SUPPLIES Carload lots f.o.b. factory Rolls, slate surfaced, 85-90 lb. per sq.	Asphalt felt, per 100 lb.	Tar felt, per 100 lb.	Asphalt coating per gal.	Tar pitch 350 lb. bbl. per ton
Atlanta	$9.50	$13.625	$1.30	$2.25	$1.20	$1.90	$1.61	$1.61	$0.27	$29.00
Baltimore	9.25	13.25	1.80	2.80	2.40	2.60	3.25	3.25	.70	2.50m
Birmingham	9.50	13.625	2.35	2.75	1.85	1.98	1.57	1.57	.32	27.00
Boston	9.25	13.25	2.00‡	2.50‡	1.80‡	1.96‡	1.85h‡	1.85h‡	.50‡	20.00‡
Chicago	9.25	13.25	2.11	2.63	1.72	1.45hf	1.50hf	1.50hf	.26f	22.00f
Cincinnati	9.25	13.25	1.65	2.85	1.55	2.40	2.39h	2.39h	.36	21.00
Cleveland	9.25	13.25	2.10	2.80	1.60	1.66	1.42h	1.42h	.34	21.00
Dallas	9.25	14.00	1.88	2.11n	....	2.50h	2.60h	2.70h	.50	34.00
Denver	9.75	13.75	1.65	2.40	.27l	2.45	4.00	3.00	.35	28.00
Detroit	9.25	13.25	1.75	3.00	1.25	2.40	2.50	2.50	.35	26.00
Kansas City	9.25	13.275	2.30g	2.55g	1.82g	1.93	2.09	2.09	.25	25.00
Los Angeles	9.50	13.75	1.60	2.25	2.30	2.10	1.50	....	.45	.....
Minneapolis	9.25	13.375	....	....	....	1.75i	1.50hi	1.50hi	.29	21.00
Montreal *p*	9.25	9.00	2.40	2.97	2.51	2.64	1.85	1.86	.63	1.85k
New York	9.25	13.25	2.03	2.55	1.64	1.92	1.66h	1.66h	.23	24.00
Philadelphia	9.25	13.25	....	....	....	2.27e	1.94he	1.94he	.41e	22.00
Pittsburgh	9.25	13.25	1.05	1.95	.80	1.95	1.94h	1.94h	.34	26.00
St. Louis	9.25	13.25	1.90/2.00	2.60/2.80	1.60/2.00	1.65	1.50	1.50	24	21.00
San Francisco	9.50	13.50	1.80	2.75n	1.10/2.00	1.65	2.26	2.26	.28	17.00
Seattle	9.50	13.75	1.80	2.60	....	1.67	1.18h	1.75	.35	28.00j

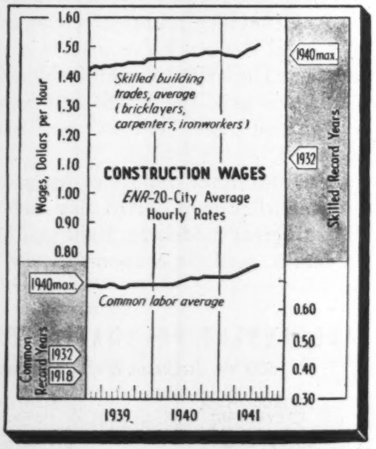
‡ Delivered. Note: Red lead in oil 50c. higher than white lead in oil. *a* Red lead prices change frequently due to pig lead price changes. *b* U. S. War Dept. Spec. 3-49A. *c* ASTM Spec. D266-31. *d* 80% minimum ferric oxide.

e Subject to 25% discount. *f* Distributors' price to contractors. *g* 5 gal. can. *h* Per roll, 65 lb. *i* Minneapolis and vicinity. *j* Asphalt pitch. *k* Per 100 lb. *l* Per lb. *m* Per bbl. *n* May price, no later quotation available. *p* Plus 8% sales tax.

SKILLED AND COMMON WAGE RATES—PER HOUR

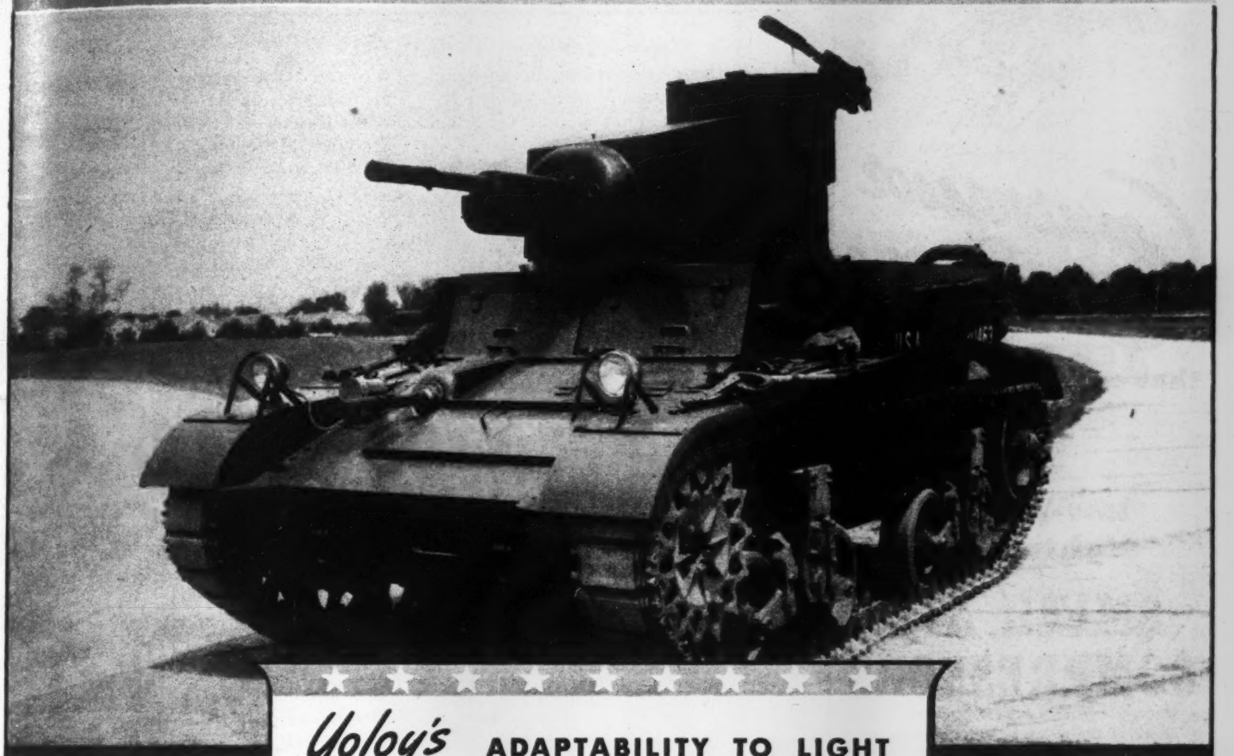
	Bricklayers	Carpenters	Struct. Iron Workers	Hoisting Engineers	Plasterers	Common Labor Building	Heavy Const.
Atlanta	$1.375	$1.00	$1.375	$1.00/1.25	$1.25	$0.40	$0.50
Baltimore	1.50	1.25	1.65	1.50	1.375	.625	.625
Birmingham	1.25/1.50	1.00/1.125	1.50	1.00/1.25	1.25	.40	.40
Boston	1.50	1.25	1.50	1.625	1.625	.85	.85
Chicago	1.70	1.625	1.70	1.70	1.70	1.025	1.025
Cincinnati	1.625	1.45	1.55	1.375/1.525	1.625	.75	.75
Cleveland	1.75	1.50	1.75	1.75	1.75	1.00	1.00
Dallas	1.50	1.00	1.25	1.00	1.50	.50/.625	.50/.625
Denver	1.65b	1.43b	1.43b	1.43b	1.50b	.718b	.718b
Detroit	1.60	1.40	1.75	1.625	1.675	.80	.80
Kansas City	1.625	1.375	1.50	1.50	1.575	.85	.50
Los Angeles	1.375	1.10	1.375	1.375	1.50	.655	.655
Minneapolis	1.50	1.25d	1.50	1.40	1.50e	.90	.90
New Orleans	1.50	1.25	1.50	1.375	1.375	.55	.55
New York	2.00b	1.85b	2.00	2.00b	2.00c	1.031	.95
Philadelphia	1.65b	1.40	1.65	1.50	1.75	.70	.70
Pittsburgh	1.90	1.50	1.75	1.25	1.75	.80	.70
St. Louis	1.25/1.50	1.00/1.50	1.75	1.50/2.00	1.25/1.75	.675/.875	.875
San Francisco	1.75c	1.25	1.60	1.50	1.667c	.85/.875	.85/.875
Seattle	1.65	1.35	1.55	1.50	1.65	.95	1.00
Montreal	.80	.70	.75	.65	.80	.45	.40

b 7 hr. day. *c* 6 hr. day. *d* 35 hr. wk. *e* 30 hr. wk.



ENR Skilled Average: (Bricklayers, Carpenters, Ironworkers) **$1.501**
ENR Common Average: $0.753

★ LEST · IT · HAPPEN · HERE ★



Yoloy's ADAPTABILITY TO LIGHT WEIGHT CONSTRUCTION CONTRIBUTES TO COMBAT-TANK MOBILITY

★ American-made tanks will speed faster, maneuver more readily, repel enemy attack more successfully — due in no small part to these new steels.

Those prime characteristics of this high-tensile, low-alloy steel which have proved their value in service in thousands of trucks, buses, railroad cars, steam shovels, tractors, etc. — lighter weight due to redesign, greater impact strength especially at sub-zero temperatures, higher corrosion resistance—have led to the use of Yoloy steel in the construction of combat tanks, gun mounts, gun shields, military truck frames and bodies, and other defense material.

Yoloy is ready for military service today, because six years ago Youngstown research was already at work to further improve those qualities needed to meet the strict requirements of national rearmament. Now, democracy is using Yoloy steel for defense equipment where it is desirable to eliminate dead weight and clumsy bulk without sacrificing strength or durability.

3-14D

YOLOY YOUNGSTOWN STEEL

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Manufacturers of Carbon, Alloy and Yoloy Steels

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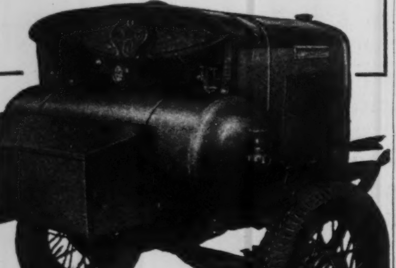
SMITH AIR COMPRESSORS

Think of the many advantages of such a lightweight, portable compressor! Move it easily from one job to another. Tow it at permissible truck speeds. Made with FORD MOTORS and standard parts—its ruggedness and efficiency are sources of constant satisfaction to users everywhere. Repairs and parts available at any Ford garage. Priced far below standard compressors of equal capacity. 60 cu. ft. size uses only 1 gal. of gasoline an hour! (Head equipped with high speed compressor valves; automatic unloading and idling.) All the power you'll need for a majority of compressor work. *Why not take advantage of this important way to save?*



With a Ford Motor and shop facilities you can assemble your own Smith Compressor. We wll furnish a Smith Compressor Head and Accessories with complete instructions for mounting.

Write for free booklet

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MEN AND JOBS

C. F. Womeldorf, retired division engineer of the Chicago & Northwestern Ry., has moved from Norfolk, Neb., and opened a consulting office in the First National Bank Building at Lincoln, Neb.

W. G. Powrie, engineer of water service on the Chicago, Milwaukee, St. Paul & Pacific Ry., has been appointed engineer of maintenance-of-way.

Charles M. Chumley, district engineer of the Illinois Central R.R., has been appointed engineer of maintenance-of-way, to succeed **Lewis H. Bond**, who has retired on account of ill health.

J. McClure Salmon, Jr., assistant supervisor of bridges and buildings, Louisville & Nashville R.R., has been appointed assistant division engineer with offices at Middlesboro, Ky.

B. W. Merrill has been appointed supervisor of bridges and buildings on the New York, Chicago & St. Louis R.R. at Conneaut, Ohio, succeeding **H. W. Koch**, retired.

Leonard Dorman, of Indianapolis, has been appointed senior engineering assistant in the city engineer's office. Mr. Dorman, who formerly held the same position under the flood control board, will succeed **Earle L. Johnson**. Mr. Johnson has advanced to street engineer, replacing **James E. Loer**. Mr. Loer was named to the newly created post of city traffic engineer. **James F. Applewhite** succeeds Mr. Dorman in his former position.

The Pennsylvania Department of Highways has announced the appointment of the following five project engineers: **George B. Hughes** of Scranton, District No. 4, with headquarters at Scranton; **John A. Ulsh** of Harrisburg, District No. 8, Harrisburg; **Earl E. Crock** of Pittsburgh, District No. 11, Pittsburgh; **Albert E. Dunsford** of Somerset, District No. 12, Uniontown; and **Clarence C. Smith** of Kittanning, District No. 11, Indiana.

E. N. Jenkins, Pine Bluff, Ark., has been appointed coordinating engineer for all Arkansas state highway WPA projects, succeeding **W. A. Stanton** of Little Rock, who will be retained as assistant coordinating engineer. Mr. Jenkins was formerly assistant state highway engineer and a district engineer with the department.

W. C. Johnston, chief draftsman; **Ben Dees**, and **N. R. Thompson**, designers; and **L. W. Hall**, resident engineer, all with the Arkansas State Highway Department, has resigned to accept defense project positions in western Arkansas and eastern Oklahoma.

Major James N. Bujac, who has been assistant to the constructing quartermaster at Camp Livingston, La., has been named constructing quartermaster on construction of the Army's new supply depot at Charlotte, N. C., which is expected to cost between two and three million dollars. **William C. Olsen** and **William Dietrich**, both of Raleigh, N. C., have been selected engineer and architect for the project, respectively.

Elmer Ward, material district engineer of the Iowa highway commission, at Mason City, recently resigned to take a position with the engineering board at Fort Belvoir, Va. He had been with the commission since 1923. He is being replaced by **Arlie Christiansen**, of Ames, Iowa.

Leo Haigsman, formerly with the U. S. Bureau of Mines, has become inspector in the technical section of the materials department of the U. S. Maritime Commission. He was graduated from Iowa State College in civil engineering in 1929.

Carl Nepper, prominent Helena, Mont., general contractor, has accepted a position with the federal government as building supervisor under the national defense program. He will be stationed at Detroit, Mich., where he will have jurisdiction over private plants being constructed with RFC funds.

Ronald M. McKinnon, assistant engineer of Halifax, N. S. for the past 8 years, has been appointed city engineer, succeeding **H. W. Johnston**, who tendered his resignation recently after fifty years' service with the city. Mr. McKinnon was city engineer of Sydney, N. S., for more than ten years.

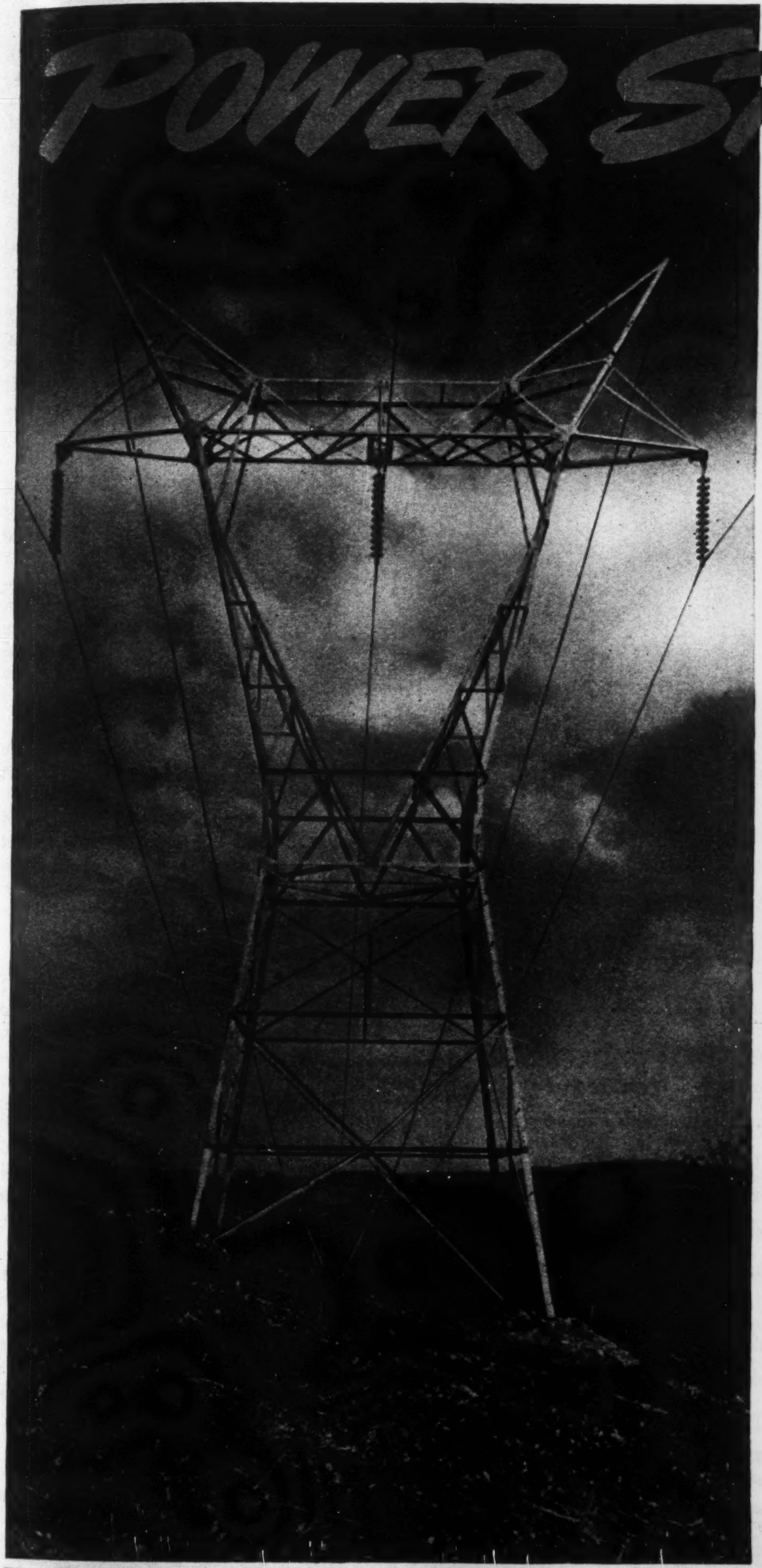
William L. Wise, assistant city engineer at Miles City, Mont., has resigned from that position to make a connection with the Pemanente Corp. at Palo Alto, Calif.

E. R. O'Neill, formerly with PWA at Des Moines, Iowa, has accepted a position with FHA at Seattle.

Stanley L. Baker, of Des Moines, Iowa, former city engineer at Newton, Iowa, has resigned to take a position with the U. S. engineers at Seattle, Wash. He will assist in airport engineering work.

(Continued on p. 94)

POWER STRIDES



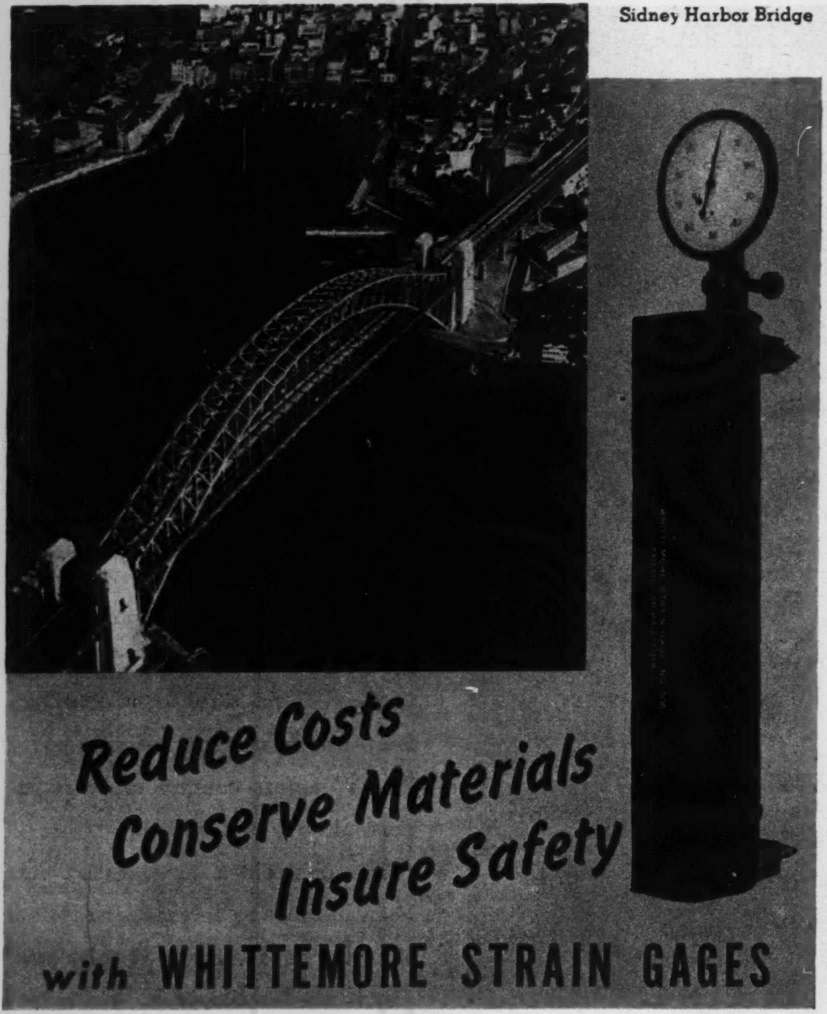
on legs of steel

High voltage lines, radiating spokelike from modern power plants, call for legs of light, sturdy steel construction—transmission towers to carry "juice" across country to every industrial nook and cranny.

The Bethlehem organization has been fabricating transmission towers since the days when wood poles gave way to steel construction. Reinforcing this broad range, practical experience is Bethlehem's fully-integrated set-up. This company has ample facilities for producing any needed quantity of structural steel; maintains strategically located, well equipped fabricating plants available to all construction areas.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY



The cost of engineering structures can be decreased through a more efficient use of material and the elimination of members which do not carry their share of the load. Safety can be insured by determining whether or not computed stresses are in close agreement with actual stresses.

Whittemore hand strain gages are inexpensive—can be used by observers having little training. With these, stresses in each member of a complex structure can be determined at a reasonable cost. Whittemore strain gages—rugged, simple, and accurate—are available in 2-in. and 10-in. gage lengths. Write for Bulletin N-153 describing these and other Southwark strain gages.

Baldwin Southwark
DIVISION OF THE BALDWIN LOCOMOTIVE WORKS
PHILADELPHIA
THE BALDWIN GROUP

(*Continued from p. 92*)

W. S. **Barrackman** of Howard, Kan., has been appointed city engineer at Eureka, Kan., succeeding **William J. Faulkner**, who has resigned to enter the employ of the Allis-Chalmers Co., Milwaukee, Wis.

Frank F. Trierweiler has been appointed manager of the concrete reinforcing division of Jos. T. Ryerson & Son, Inc., to take the place of **E. W. Langdon**, who died May 1. Mr. Trierweiler, graduate of the University of Michigan in 1915 and associated with Jos. T. Ryerson & Son since 1924, will have general supervision of the reinforcing business at all jobs and plants. His headquarters will be in the Chicago office.

Humphrey Beckett, who has been with the water department of the District of Columbia since 1901, has been named superintendent of the Washington (D. C.) water department to succeed **D. W. Holton**, who retired June 1. **David V. Auld**, now an engineer in the sewer division, was appointed senior engineer in the water department, where he will serve as assistant superintendent.

William C. E. Becker, engineer in charge of the division of bridges and buildings, Board of Public Service, St. Louis, Mo., since 1933, has resigned and plans to return to the private practice of engineering with offices in the Ambassador Building. **Walter Crecelius**, Mr. Becker's former assistant, will be his successor temporarily.

W. W. **Bell**, engineer in charge of No. 1 district (including Vancouver Island and Mackenzie), has been appointed as assistant chief engineer of the British Columbia provincial department of public works. Mr. Bell is succeeding to the post left vacant on the recent retirement of **George P. Napier. Major J. M. Stewart**, inspector of bridges and railways, was promoted at the same time to the position of deputy minister of railways.

Lt. Col. Harry W. Anderson, commanding officer of Indiantown's 103rd Engineer Regiment, at Indiantown Gap, Pa., has been promoted to the rank of colonel. In civilian life Col. Anderson is associated with the Pennsylvania R.R. as a civil engineer.

E. H. **McGovern** has been appointed assistant district engineer with the New York Central system, effective June 1.

Capt. H. G. Gerdes, head of the Corps of Engineers at the Charlotte, N. C. airbase, was transferred to Fort Sumter, S. C. on June 15, to take charge of building a $3,300,000 army flying school.

No Bombs Fell Here

Looking a little like too-familiar war pictures, this might better be titled "Constructive destruction." Charles S. Spillman's ⅜-yard 10-B is shown handling clearance work for a Baltimore housing project. The speed with which Bucyrus-Eries can handle work like this is not as vital as it would be if this were a bomb clearance job, but it's plenty important just the same.

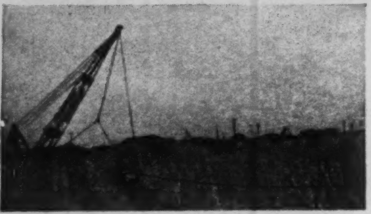
It's speed that means low costs to the contractor and a job well and quickly done for his customer.

The complete line of Bucyrus-Erie excavating, drilling and material handling equipment has the stuff to meet the challenge of today's working conditions. It will pay you to investigate the size Bucyrus-Erie you need.

Bucyrus-Erie

SOUTH MILWAUKEE, WISCONSIN

. . . ON TOUGH EXCAVATING JOBS



This picture shows how a crane can be used as a power unit to operate a Sauerman Scraper. A 10,000,000-gal. circular reservoir was dug in short order by rigging a 500-ft. slackline cable from the crane boom and suspending a Sauerman bucket from a carrier running on this cable.

Sauerman Slackline Cableway digs boulders and hardpan to clean out a 1-mile tailrace and increase the head for a hydroelectric plant.

in Dry Ground

SAUERMAN Power Drag Scrapers and Slackline Cableways will dig any material that can be turned with a plow and will haul said material for a few cents per cubic yard *at working ranges up to 1500 ft.*

or Under Water

SAUERMAN Machines dig sand, gravel and hardpan; will deepen channels, remove bars, clear spillways, or carry rocks — digging, conveying and dumping material in one economical operation. Because they require but a single operator, consume little power in operation, and require practically no maintenance, these machines are extremely profitable to use.

WRITE FOR COMPLETE CATALOG!

For over 30 years SAUERMAN Machines have solved material-handling problems all over the world.

SAUERMAN BROS., Inc.
432 S. CLINTON ST., CHICAGO, ILL.

STERLING
CONTRACTOR'S WHEELBARROWS

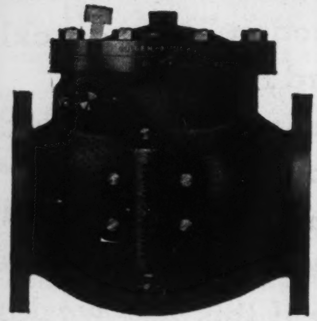
S-18—FOR CONCRETE
With Pneumatic Tire Wheel

Quality Wheelbarrows for all contracting and industrial purposes.

Trays Double Lapped at Corners
Convenient Warehouse and Distributors Stocks 3

Sterling
WHEELBARROW CO.
MILWAUKEE, WISCONSIN

See page 66 of our new 96-page catalog for information on this
CUSHIONED SWING CHECK VALVE



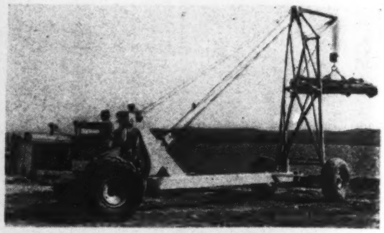
This Swing Check Valve is properly designed for balanced operation, and for allowing full pipe line flow with minimum pressure drop; and it is especially arranged with cushion chamber on the side to prevent any slapping or banging of the disc against the seat on reverse flow.

GOLDEN-ANDERSON VALVE SPECIALTY CO.
Fulton Building Pittsburgh, Pa.

New Aids to the Constructor

Fluorescent Luminaires

A new fluorescent luminaire employing two of the recently announced 100-watt, 60-in., white, or daylight fluorescent lamps has been announced by Westinghouse. The fixture consists of a hood, reflector, lamp holders, starting device and ballast equipment. Reflectors are 18-gage porcelain enameled steel and the outfit is available for operation on 110, 125, 199, 216 and 220–250 volts, 60 cycle, a.c., current.—*Westinghouse Electric & Mfg. Co., Lighting Division, Cleveland, Ohio.*

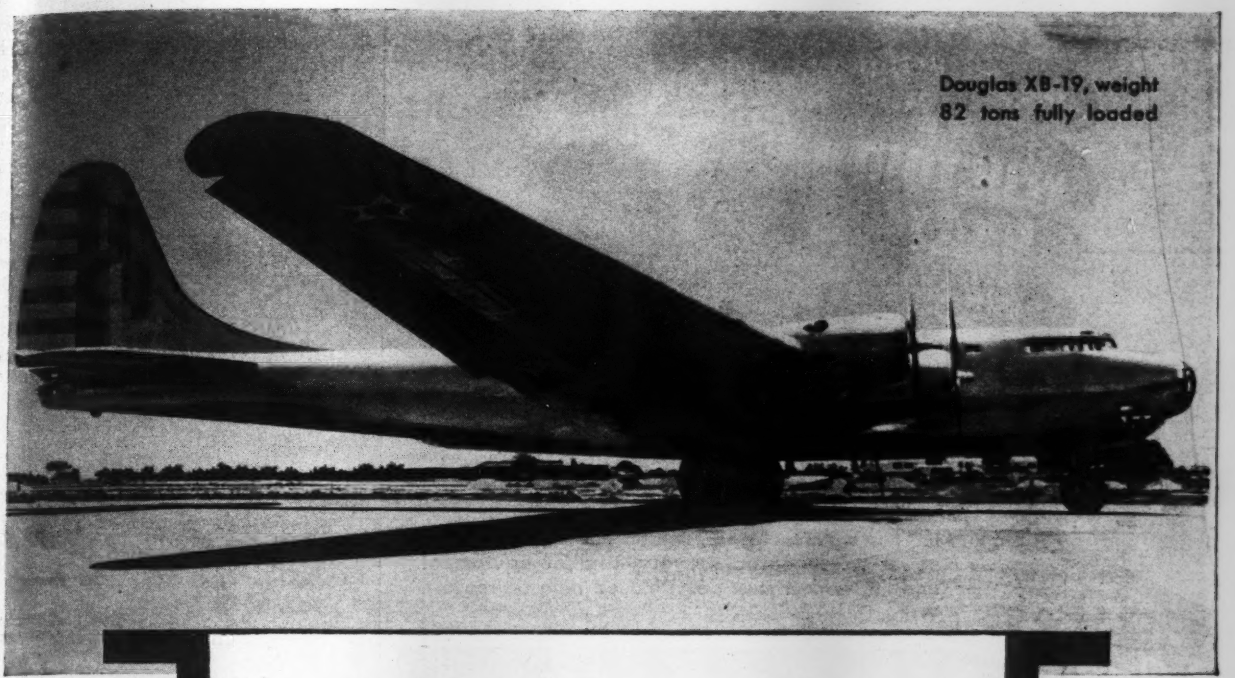


High-Speed Mobile Crane

Combining the speed of a Tournapull and the lifting power and maneuverability of a tractor crane, LeTourneau introduces the Tournacrane, a money-saving tool for contractors and industry. Boom lengths of 20, 30 and 40 ft. and a lifting capacity of 10 tons fit the Tournacrane to a wide variety of jobs. Tournapull traveling speeds, up to 14 m.p.h., shorten time between widely separated jobs and extend the work range of the crane. Tournapull two-wheel maneuverability enables the Tournacrane to work in extremely close quarters and over rough terrain. The Tournacrane is interchangeable with other Tournapull tools, such as Carryall Scrapers and Tournatrailers, only 15 or 20 minutes being required to convert the machine.—*R. G. LeTourneau, Inc., Peoria, Ill.*

Mobile Lubrication Unit

The Graco Convoy Luber is a mobile lubrication unit for heavy duty field lubrication service. It is constructed to maintain alignment and stability under all conditions of weather and terrain, even at relatively high rates of speed. The unit is self-contained and assembled on



Concrete runways will safely carry the XB-19

—because concrete has the strength and rigidity to provide durable, true and even runways for any weight of plane

When concrete is specified for runways, the pavement can be engineered and built to the strictest requirements of commercial and military aircraft. Accurate formulas enable engineers to design concrete runways for any weight of planes or repetitions of take-offs and landings.

Concrete runways, because they stay true and even, help planes to develop maximum efficiency in carrying capacity and flying range.

And concrete's cost is low. Concrete in almost every case will provide a given load capacity suitable for primary airports at lower first cost than other pavement types, and at much lower annual cost.

A 500,000 sq.yd. runway job can be built with concrete in 30 paving days.

Plus values—in addition to strength, durability and low annual cost, concrete runways offer maximum skid resistance, high visibility, durability under changing weather conditions, a true and even surface that will get planes into the air with maximum load.

PORTLAND CEMENT ASSOCIATION
Dept. A7a-17, 33 W. Grand Ave., Chicago, Ill.

A national organization to improve and extend the uses of concrete . . . through scientific research and engineering field work

The Next Thing to a "CUSTOM BUILT" Job . . .

Model VE-4
22 hp. Engine.
Other types and sizes:
1 to 35 hp.

Careful, unhurried hand-fitting of aluminum-alloy pistons into mirror-honed cylinder bores; accurately numbered and mated rods; crank pins ground on micrometer-gauged machines for extreme accuracy in finish, roundness and diameter . . . every detail of Wisconsin Engine construction is handled with "custom-built" thoroughness. Not "how *many*" but "how *good*" is what counts with us. It should count with you, too.

Be Wisconsin-equipped for dependable, heavy-duty power . . . geared to your kind of equipment and the work it must do. Detailed data on request. Write: Dept. G-7.

MOST POWER PER POUND
HEAVY-DUTY AIR-COOLED ENGINES
by WISCONSIN MOTOR CORPORATION
Milwaukee, Wisconsin, U. S. A.

World's Largest Builders of Heavy-Duty Air-Cooled Engines

Yes...
we're set up to also handle your
Hot Dip Galvanizing

Our recently enlarged facilities and new equipment provides the solution to practically any galvanizing requirement . . . ready to meet the most exacting specifications. Materials may be shipped to us via boat, truck or any railroad. Galvanized products furnished. Regular suppliers to the government for over 40 years.

ENTERPRISE GALVANIZING COMPANY
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Economical - Safe - Sanitary
DOBBINS
SUPERBILT PORTABLE DRINKING FOUNTAIN

COOL-CLEAN-WATER AND SALT GIVE HEALTH & STRENGTH TO YOUR WORKMEN
Meets the requirements of all Public Health Authorities →

FULLY INSULATED
4 GAL CAPACITY

Saves Money on the Job

● Eliminates pails, kegs, dippers, individual cups. The Dobbins Portable Drinking Fountain and Salt Dispenser saves pay roll losses, prevents heat prostration, cramps, etc. Men on any job can now be assured the same protection from disease spreading drinking equipment that is afforded in modern plants.

● No. 3 Adjustable Waterproof Shoulder Carrying Strap

SALT DISPENSER
Capacity 500 Tablets

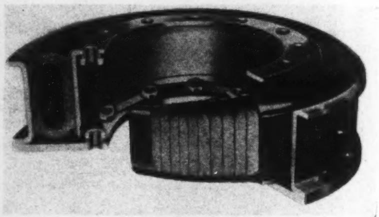
● 3 WAY MOUNTING BRACKETS
For trucks and tractors.
For inside and outside use.

NEW ILLUSTRATED CIRCULAR MAILED ON REQUEST

OVER 150,000 NOW IN USE

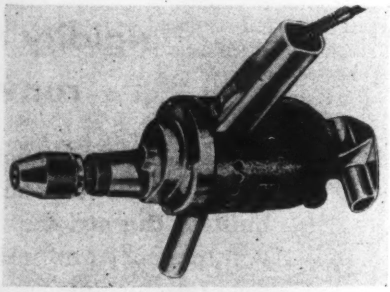
DOBBINS MANUFACTURING COMPANY
FACTORY • ELKHART INDIANA

skids for easy mounting on a heavy duty two-wheel trailer or on any one-ton truck of suitable dimensions. Various types of Graco Lubers are available, but all incorporate an air compressor with air storage tank, three heavy duty lubricant pumps especially designed for dispensing chassis lubricant, gear lubricant or motor oil and track lubricant, five convenient service reels which facilitate the use of service outlets, and a complete set of accessory lubricating equipment. De luxe models offer, in addition to the above features, an electric generator suitable for lighting night operations or for quick-charging batteries.—*Gray Co., Inc., Minneapolis, Minn.*



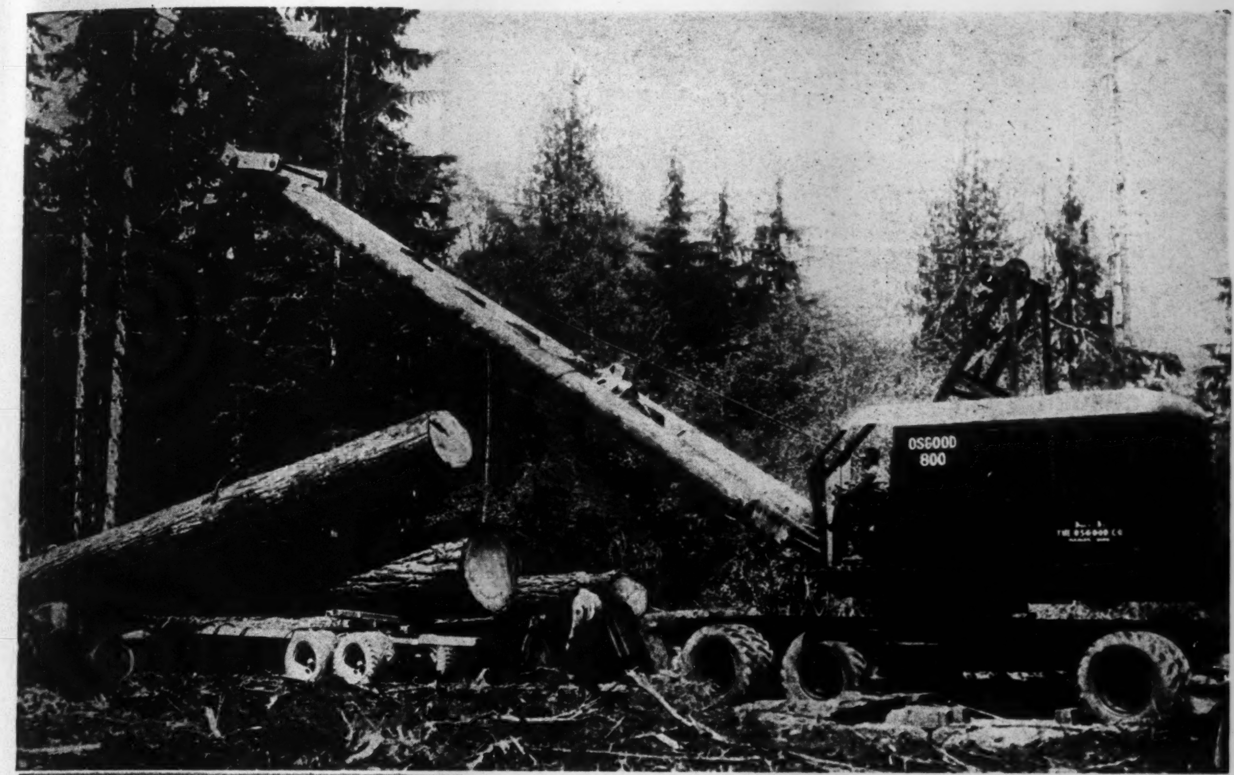
Airflex Couplings

Falk Airflex couplings have been developed especially to protect machinery from the impact resulting from the irregular torque characteristics of the prime mover or the driven machine. They consist essentially of a special resilient rubber gland with an outer section built up of multiple layers of cotton fabric and permanently bonded to steel outer rims. Bulletin 8100 describes this equipment and gives information on how to select Airflex couplings.—*The Falk Corp., Milwaukee, Wis.*



Electric Drill

The Speed-Way ½-in. drill, a high-powered electric tool, light enough for portable use yet heavy enough to stand up to production drilling, has a powerful, specially wound, high torque back geared Universal SpeedWay drill motor. It is said that the drill's low load speed makes it particularly adaptable for use with carbide drill bits in drilling brick, concrete, etc., as well as regular production drilling in steel, wood, and other materials.—*Speedway Mfg. Co., Cicero, Ill.*



OSGOOD

OSGOOD Model 800 Mobilcrane equipped for loading logs in a selective logging operation in Washington. Selective logging requires frequent and long movements of loading and hauling equipment. The Mobilcrane is ideally suited for such work and for service in any large Industrial, Shipbuilding and Material Yard.

THE MOBILCRANE—

the newest thing in mobile, ONE ENGINED—ONE-MAN-CONTROLLED, cranes, for all kinds of efficient material handling. Air control of hoist, swing and travel, air brakes and hydraulic steering make this Model 800, 20 ton crane as easy to handle as a truck.

Write for latest information on OSGOOD air-control Mobilcranes.

The
GENERAL
EXCAVATOR CO.
Sizes: $\frac{3}{8}$ - $\frac{1}{2}$ - $\frac{5}{8}$ - $\frac{3}{4}$
DIESEL - GAS - ELECTRIC
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Associated with
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HERCULES
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6 to 12 Tons
Diesel or Gasoline
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Sizes:
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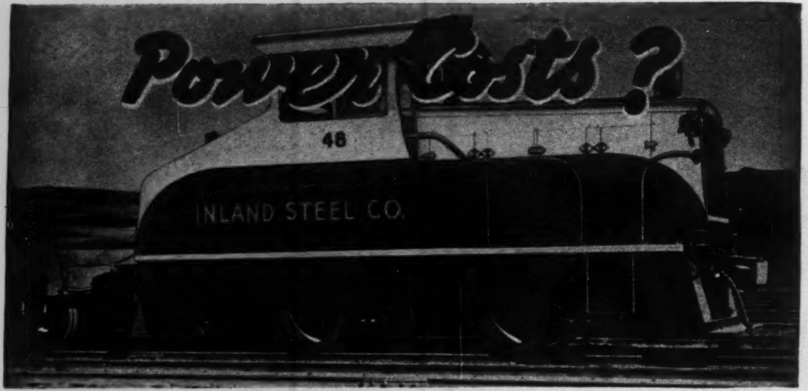
OSGOOD MARION OHIO U.S.A. GENERAL HERCULES
SHOVELS
DRAGLINES - CRANES
Crawler & Wheel Mounted
THE OSGOOD COMPANY, Marion, Ohio



AFTER CHECKING THE FACTS — — — YOU'LL AGREE — — —

FLEXOMOTIVES ARE FIRST

ANY industrial locomotive will help you to haul greater tonnage . . . faster and at lower cost than other methods. But there the similarity ends. There's a real difference in various types of locomotives . . . a difference that strikes home when actual performance and cost records are studied. Look at ALL the locomotives on the market. Review ALL the facts. You'll find that Plymouth Flexomotives are FIRST in Economy, Power, Efficiency, Availability, Flexibility and Ruggedness.

Write for Bulletin

PLYMOUTH LOCOMOTIVE WORKS
Division of The Fate-Root-Heath Co.
Plymouth, Ohio

Plymouth FLEXOMOTIVE

GIVES YOU EVERYTHING YOU WANT IN A LOCOMOTIVE!

Compact! Powerful! Safe!

DISTRIBUTABLE CONTROLLED POWER

with Beebe Bros ALL STEEL HAND HOIST
SEATTLE, U.S.A.
TRADE MARK REGISTERED

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Money Has Been Saved on These Jobs!

1200' assembled pipe (132 Tons) were lowered to bed of Mississippi at St. Paul with 9—5-Ton Beebes, three lines to each hoist through blocks.

Hudson River Bridge sidewalks were laid in sections with 32—5-Ton Beebes.

Longest wooden trusses in world were installed with ONE 5-Ton Beebe after power hoists proved impractical.

★

When raising, lowering, or placing costs by power are a serious problem, the answer is the right number of Beebe Bros. All Steel Hand Hoists MANNED IN UNISON. Available in 2, 5 and 15 Ton sizes. Sold through leading dealers in all trade centers. List of dealers sent upon request.

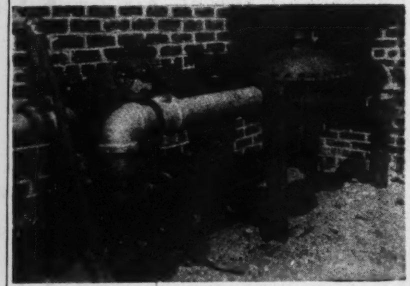
BEEBE BROS., 2720 6th Ave. S., Seattle, U.S.A.

★

"THE STRONGEST GEARED POWER FOR ITS WEIGHT IN THE WORLD"

BIG METERS FOR BIG JOBS...

PITTSBURGH LARGE CAPACITY METERS

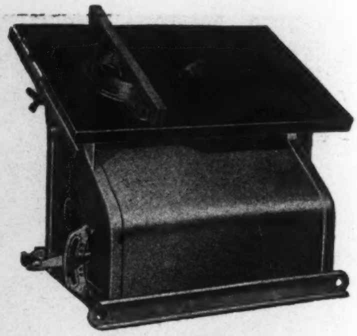


Installation of Large Capacity Arctic-Tropic Disc Meters

In any industrial plant the amount of water used runs into surprisingly large figures. Unless this consumption is accurately metered, there will be an appreciable loss in revenue from this important type of consumer.

Pittsburgh Large Capacity Meters are made in Disc, Current and Compound types. All are accurate and thoroughly dependable. From this complete line the proper type and size for any particular job may be selected.

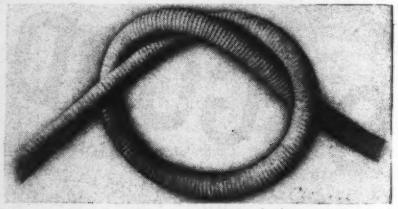
PITTSBURGH EQUITABLE METER CO.
400 LEXINGTON AVE. PITTSBURGH, PA.



Power Saws

Kost Kutter, Sr., illustrated here has advanced vibration-proofed rubber and spring engine mounting which adds years to the life of the entire rig. It is a fast cutting, sturdy outfit, easy to transport and does the work of larger and heavier units. Convenient foot pedal pulls the "balanced" swing arbor through for cut-off work. Arbor can be locked in any desired position for ripping.

A Kost Kutter, Jr., is also available with 10-in. combination cross-cut and rip blade, a handy precision rig for smaller jobs or finer sawing. A new CMC catalog gives the entire story on the power saw line.—*Construction Machinery Co., Waterloo, Iowa.*



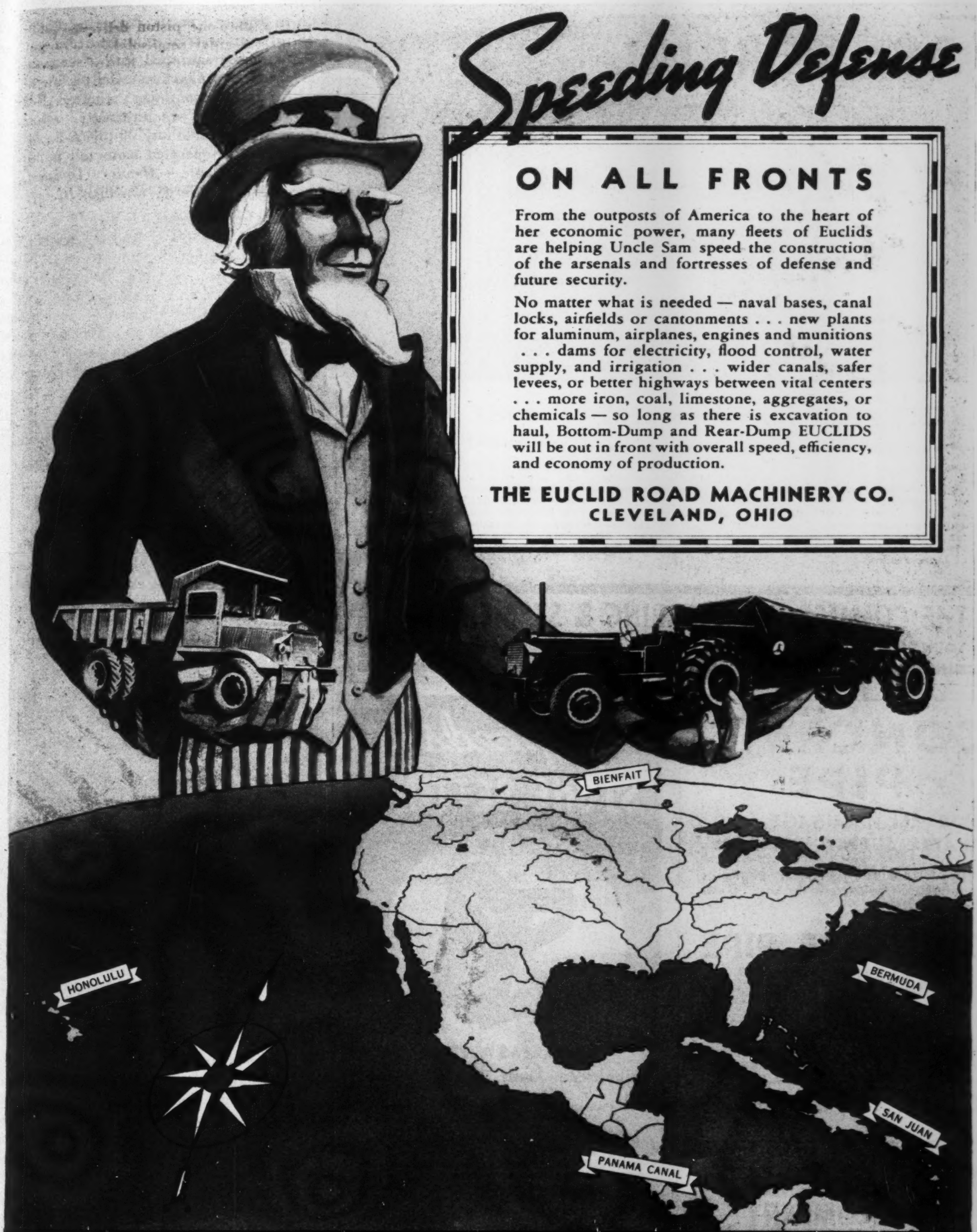
Suction Hose

Bull Dog is claimed to be the most flexible suction hose made. The hose has a thick tough red rubber cover which enables it to stand abrasion from pump pulsation or cover chafing. It can be coiled without displacing the internal wires, and if dented or crushed can be easily and quickly hammered back into shape with a mallet. It has a smooth rubber tube which insures full flow of liquids and a spring steel round galvanized wire embedded in the hose where it cannot be displaced by sharp bending as is often the case with exposed wire hose. —*Boston Woven Hose & Rubber Co., Boston, Mass.*

Barrel Pumps

New and highly efficient lubrication barrel pumps, especially designed for heavy duty usage by contractors, and for fleet garages, are announced by Alemite. One outfit is a volume barrel pump for 400-lb. oil drums, which operates

Speeding Defense



ON ALL FRONTS

From the outposts of America to the heart of her economic power, many fleets of Euclids are helping Uncle Sam speed the construction of the arsenals and fortresses of defense and future security.

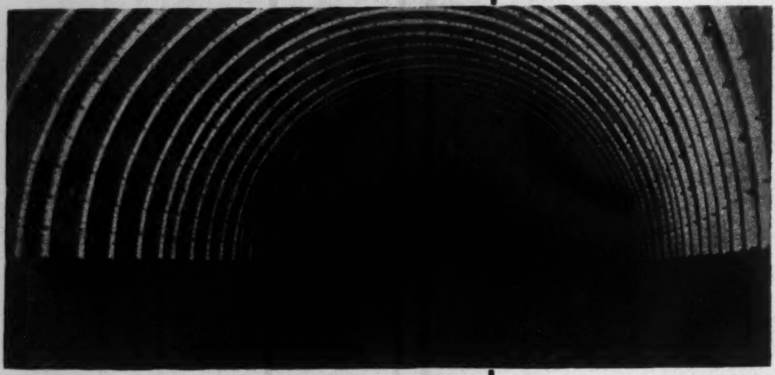
No matter what is needed — naval bases, canal locks, airfields or cantonments . . . new plants for aluminum, airplanes, engines and munitions . . . dams for electricity, flood control, water supply, and irrigation . . . wider canals, safer levees, or better highways between vital centers . . . more iron, coal, limestone, aggregates, or chemicals — so long as there is excavation to haul, Bottom-Dump and Rear-Dump EUCLIDS will be out in front with overall speed, efficiency, and economy of production.

THE EUCLID ROAD MACHINERY CO.
CLEVELAND, OHIO

EUCLID

SELF-POWERED
EARTH • ROCK • COAL • ORE
HAULING EQUIPMENT
And — CRAWLER WAGONS • ROTARY SCRAPERS • TAMPING ROLLERS

COMMERCIAL



MEETS EVERY TUNNELING NEED . . . HERE, A HIGHWAY UNDERPASS!

The many uses to which you can put COMMERCIAL LINER PLATES are only surpassed in value by their installation features of safety, economy and easy use. Here, you see COMMERCIAL Plates utilized in underpass construction on the Maricopa-Ventura highway in California. Note the neat appearance . . . the perfect safety the COMMERCIAL Plates provide. COMMERCIAL plays an important part in low cost highway construction that requires underpasses. Consult with one of our representatives. He'll show you a plate for your next job, regardless of tunnel size or ground conditions. In the meantime, write for our latest catalogs and familiarize yourself with the complete COMMERCIAL selection of Liner Plates.

THE COMMERCIAL SHEARING & STAMPING CO.
YOUNGSTOWN OHIO

CONCRETE PIPE
FOR ALL DRAINAGE AND WATER SUPPLY PURPOSES

Shipped from our permanent plants or manufactured at the site by one of our mobile units.

CONCRETE PIPE EQUIPMENT
FOR SALE OR LEASE

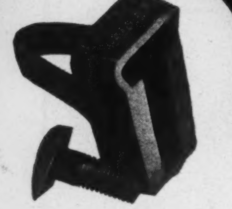
For manufacture of pipe by engineers and contractors at remote locations.

CONCRETE CRIBBING

UNIVERSAL CONCRETE PIPE COMPANY
MAIN OFFICE
COLUMBUS OHIO

Plants can conveniently serve projects in: Massachusetts—Connecticut—New York—New Jersey—Pennsylvania—Ohio—West Virginia—Georgia—Florida—Michigan—Indiana — Illinois—Tennessee—Kentucky—North Carolina—South Carolina.

Speeds
STONE SETTING



PEERLESS WEDGE
Adjustable Shelf Angle Support

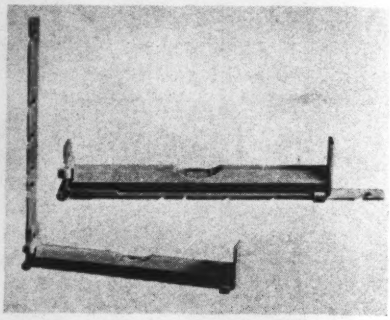
The Peerless Wedge is an insert that securely holds in properly adjusted position the shelf angles used to carry veneer or exterior facing of building walls. It is very easily applied at the exact position specified and particularly advantageous to install in the usually hard-to-get-at places. The Peerless Wedge is made of high grade malleable iron, so cast that it retains the necessary rigidity under load.

Specify U. S. 425—for the ⅝" bolt
U. S. 436—for the ¾" bolt

Write for Catalog—See Sweet's, Sec. 3-49

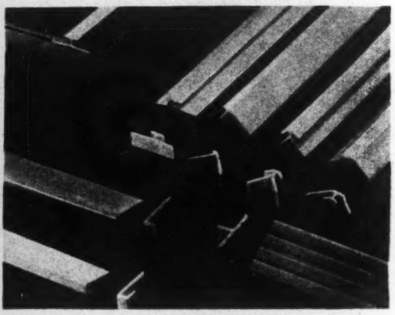
UNION STEEL PRODUCTS CO.
417 Pine St. Albion, Michigan

with a 40-to-one piston delivering up to 6 lb. of regular semi-solid lubricant per minute. When equipped with a seven-to-one piston this piston can deliver up to 16 lb. of lubricant per minute. For smaller volume requirements other pumps are available for 100 to 400-lb. oil drums. An air-operated motor oil pump is now available.—*Alemite Division, Stewart-Warner Corp., Chicago, Ill.*



Slope Level

The slope level shown above is a pocket tool designed to be used with a string for checking slopes. It has a collapsible arm at one end with notches for the following slopes: 1:1, 1½:1, 2:1, 3:1, 4:1. This device can also be used as a line level.—*J. O. Cornell, Falmouth, Ky.*



Plastics

Plastiktrim and Plastikmould cover the manufacture of molded and extruded plastics in the form of angles, channels, cap sections, inside and outside corners, decorative shapes, etc. These extruded plastic shapes, both rigid and flexible, are used for decorative finishes and trims, as well as for commercial industrial and architectural designs.—*R. D. Werner Co., Inc., 380 Second Ave., New York, N. Y.*

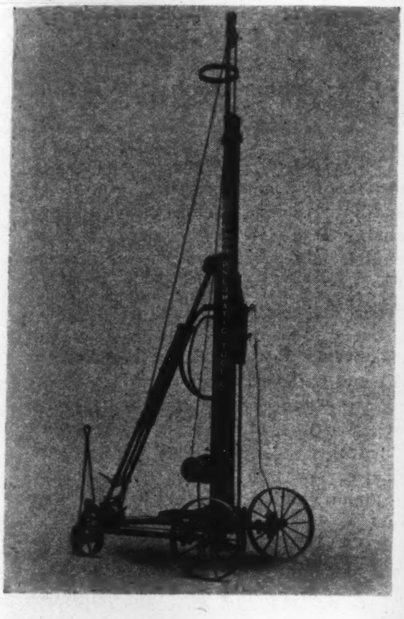
Transfer Film

A matte transfer film has been developed with which engineering drawings can be printed either by contact or by projection on photo-sensitized metal sheets, and the process plates bearing the photographic image may then be sent directly to the Template Department to be cut out and used as a pattern or template. Present maximum width of the film is 34½ in., but enlargements to 4 x 12 ft. have been made. Full information from the—*Eastman Kodak Co., Rochester, N.Y.*

Light Cement

A new Portland cement combining permanence, safety and economy in light-colored concrete is being marketed under the title, "Verilite." Because of its extreme lightness in color and because of its economy, "Verilite" cement makes it possible to use light-shade cement in concrete for bridge heads, center lane markers, curbings, etc. "Verilite" cement also can be used on commercial, industrial and institutional buildings for architectural concrete.

"Verilite" easily accepts pigmentation when colored concrete or mortar is desired.—*The Missouri Portland Cement Co., St. Louis, Mo.*

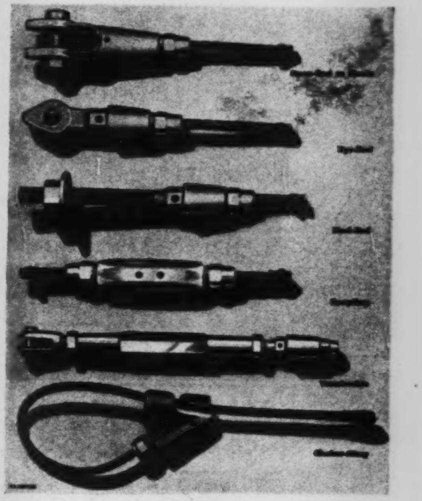


Wagon Drill

A new wagon drill, especially designed for deep drilling, up to 40 ft. holes, is particularly adapted to such work. It has gravity feed and air (or hand) hoists, adjustable tilting tower, and will mount any type of CP drifter. Hand crank operation tilts the towers 25 deg. forward or backward and a 7½-deg. lateral adjustment permits compensation for rough surfaces or angle drilling. The large wheels of this G-500 drill give quick portability and can be easily turned at right angles for line drilling or broaching. —*Chicago Pneumatic Tool Co., 6 E. 44th St., New York, N. Y.*

Prolong Wire Rope Life . . .
INSURE SAFETY . . . INSTALL QUICKLY
Streamline the Appearance
By Specifying
Electroline
FIEGE
CONNECTORS

"They Hold Like a Bulldog"



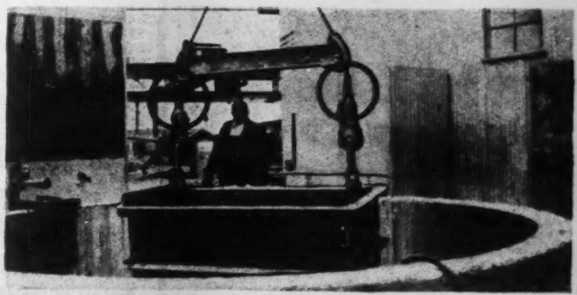
WHEREVER wire rope is used, Electroline-Feige Connectors have proved their efficiency, on all types of equipment.

Compact and streamlined — simple and strong — easily installed, they are the first selection of experienced operators.

Their "feathered-off" compression grip greatly prolongs the life of the wire rope or steel strand to which they are attached—they are economical as well as safe.

Our New Bulletin F-2 gives full specifications and performance details. Write for it.

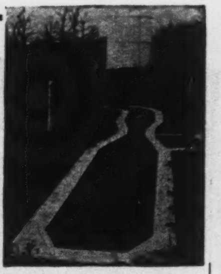
Available in Drop Forged SAE-1040 Steel, Rope sizes ¼" and larger, in black, hot-galvanized or cadmium-plated; also, in Rope sizes ½" and smaller, in bronze, stainless steel and monel metal.

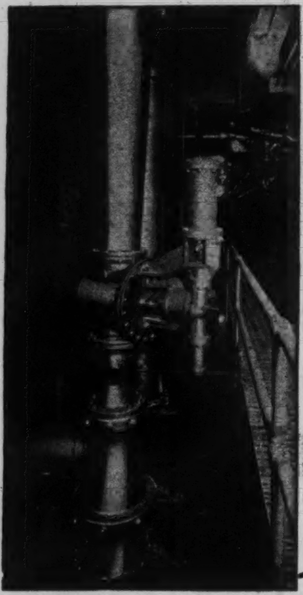


On a Water Supply Tunnel Project, the City of Chicago handles loaded cars from the bottom of the entrance shaft with Electroline-Fiege equipped cables.

The Electroline-Fiege Inspection Hole insures a reliable connection because it shows, at a glance, the perfection of the joint

Electroline Company
4121 SOUTH LA SALLE STREET • CHICAGO, ILLINOIS





Which Primary Element?

VENTURI TUBE, FLUME, WEIR,
ORIFICE, OR NOZZLE

The primary element for your metering application should be selected not arbitrarily but by the requirements to be fulfilled and by the economic considerations entering into the installation.

Sewage and sludge are often, though not always, measured by Venturi Tubes, Flumes, or Weirs.

Water may be satisfactorily measured by any type of primary element. Factors such as the cost of pumping, the pressure and the size of pipe or channel usually dictate the device used.

Steam is usually measured by the Bailey Orifice or Flow Nozzle.

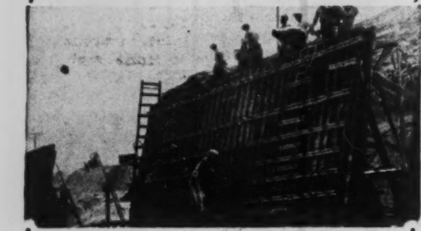
Bailey Meter Company holds no brief for any particular primary element, its only interest is in making sure that the user secures the highest accuracy and reliability at the lowest expense.

Detailed information on the advantages of various types of primary elements furnished on request.

MU-18

BAILEY METER COMPANY
1029 IVANHOE RD., CLEVELAND, O.
Bailey Meter Company Limited, Montreal, Canada

VIBER
COMPANY
CONCRETE
VIBRATION



MORE PROFITABLE FOR WORK
in hard-to-reach places

Recommended for use in large reinforced concrete building construction with walls over 10 inches in thickness. Piles made in place, foundations, large girders, thick floor slabs, and columns.

This flexible pneumatic vibrator is particularly desirable for successfully compacting concrete with large aggregate and a low-water-cement ratio.

Write for complete Viber data—today!

VIBER COMPANY
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PAVING SHOVEL and BACK HOE TRENCHER

***Keystone* Model 18-A, one yard, full revolving convertible crane is, also, a general utility power shovel and can be equipped with 1 yd. or 1¼ yd. *Skimmer*, for surface grading, or *Back Hoe* trench buckets 18 inches to 60 inches wide, for operation below grade. Its generous power is applied through Keystone's unique over-size *planetary drums* and V-friction clutch wheels, giving absolute control of line and swing speeds and power application. This makes it the dragline without peer . . . Gasoline and Diesel powered.**

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NEW PUBLICATIONS

Pneumatic Tools—A new catalog describes the complete line of Thor mining and contractors' air-powered tools: rock drills, paving breakers, clay and trench diggers, sump pumps, saws and associated air tools, and gives detailed information on accessories and important construction features. Ask for Catalog No. 42.—*Independent Pneumatic Tool Co., Chicago.*

Portable Substation—An 8-page bulletin describes portable substations available in all voltage ratings up to 69 kv and in capacities up to 4500 kva. Typical trailer mounted substations are illustrated with engineering details such as core and coils, heat exchanges, and automatic protection explained.—Ask for Bulletin B-2281.—*Dept. 7-N-20m Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.*

Refractory Concrete—An illustrated booklet, with charts and sketches, describes methods of building industrial furnace and kilns with reinforced refractory concrete.—*The Atlas Lumnite Cement Co., 135 East 42nd St., New York City.*

Prefabricated Housing — Explaining the technical and practical aspects of Lindsay Structure prefabricated all-steel housing is a new pocket-sized 16 page booklet.—*The Dry-Zero Corp., Lindsay Structure Division, Merchandise Mart, Chicago.*

Concrete Paving—A well illustrated 24-page bulletin, intended for highway engineers and contractors, describes the Jaeger method of paving without pavers. It features side discharge truck mixers, concrete spreaders, and a special charging scheme to integrate haul by dump truck to a point close to the work and transfer to the truck mixers for short haul delivery.—Ask for Bulletin CMC-41.—*The Jaeger Machine Co., Columbus, Ohio.*

Compressors—A comprehensive catalog describes the complete line of Davey compressors including those designed for auxiliary mounting on various types of units and features a new lifetime guarantee on Davey compressor valves.—*Davey Compressor Co. Inc., Kent, Ohio.*

Jacks—A folder describes the many jacks available under the Simplex trademark; ball-bearing screw jacks, journal jacks, track jacks, geared jacks, push-and-pull jacks, steamboat ratchets, etc.—*Templeton, Kenly & Co., 1020 S. Central Ave., Chicago, Ill.*

Manufacturers' Activities

Pittsburgh Equitable Meter Co., Pittsburgh, has announced that Ross J. Burns has joined the company in the capacity of national representative. Mr. Burns, who is well-known in the waterworks field, was with the Badger Meter Mfg. Co. for many years and previous to that was in the plumbing and heating supply business.

R. G. LeTourneau has announced that Al Losch left early in June to take charge of a new manufacturing company, Leo Tutt & Co., Ltd., at Sidney, Australia, formed to construct LeTourneau equipment there.

Robert M. Peterson, assistant advertising manager of American Steel and Wire Co., Cleveland, died recently.

Masonite Corp. executives have announced that more than $1,500,000 is being spent for expansion and improvements in its plant at Laurel, Miss. Largest single expenditure is for an $800,000 steam turbine power plant which will go into service Aug. 15, supplying nearly 13,500 kilowatts of electric power. To increase rate of production of Presdwood Temprtile and other hardboards, new press capacity is being added, present equipment is being speeded up and the humidifying units are being lengthened and enlarged.

W. N. Conger, for 24 years highway reinforcing products salesman for Truscon Steel Co., Youngstown, Ohio, died recently at the age of 85.

Ransome Concrete Machy. Co., Dunellen, N. J., has appointed the State Tractor & Equipment Co., Phoenix, Ariz., as exclusive distributor in Arizona to handle their complete line of equipment.

The Falk Corp., Milwaukee, has announced the appointment of W. L. Schneider as vice president, T. F. Scannell as sales manager and J. B. Kelley as assistant sales manager.

Herbert J. Braun, formerly with Foote Bros. Gear and Machine Corp., Chicago, has been appointed Detroit sales representative for Kennametal steel-cutting carbide tools and blanks by McKenna Metals Co., Latrobe, Pa.

E. W. Christener has been appointed sales manager of the Chicago reinforcing bar division of Joseph T. Ryerson & Son, Inc. A native of Zurich, Switzerland, Mr. Christener came to this country in 1914, and entered the steel business after a period as draftsman and engineer for a contractor.

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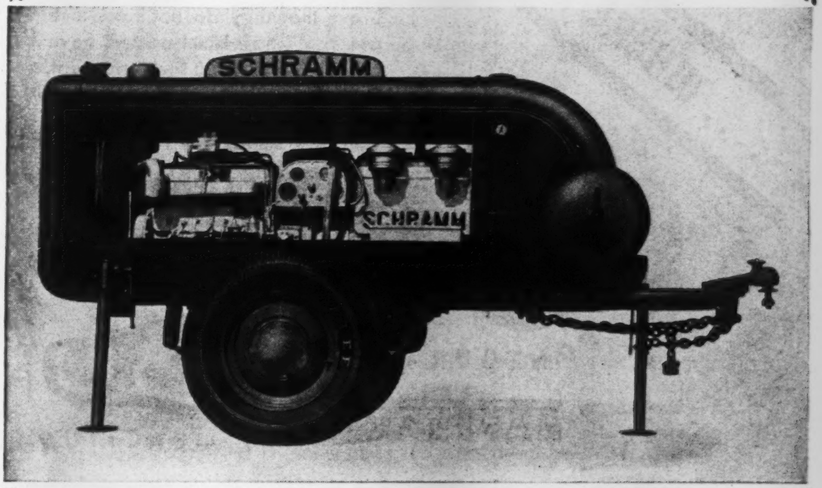

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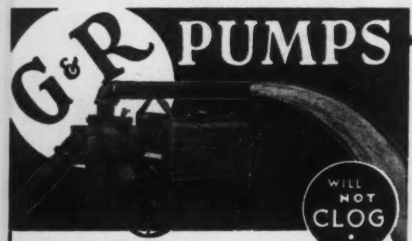

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MEETINGS

American Society of Civil Engineers, Annual Convention, U. S. Grant Hotel, San Diego, Calif., July 23-25.

Photoelasticity, Summer Short Course, Massachusetts Institute of Technology, Cambridge, Mass., July 28-Aug. 8.

Pan-American Highway Congress, fourth exposition, National Stadium, Mexico City, D. F., Sept. 15-24.

REGIONAL AND LOCAL MEETINGS

Public Health Engineering, short course, water, sewage and camp sanitation—Massachusetts Institute of Technology, Cambridge, Mass., June 16-July 25.

Carolina Branch, Associated General Contractors, Ocean Forest Hotel, Myrtle Beach, S. C., July 11-12.

Western Pennsylvania Section, American Water Works Association, annual convention, Erie, Pa., Aug. 7-9.

Pennsylvania Sewage Works Association, State College, Pa., Sept. 3-5.

Northern Michigan County Road Commissioners Association, annual meeting, Cheboygan, Mich., Sept. 18-19.

New York State Association of Town Highway Superintendents, Rochester, N. Y., Sept. 18-20.

ELECTIONS AND ACTIVITIES

Anson Marston, dean emeritus of the engineering division at Iowa State College, has been named recipient of the Lamme gold medal award, given annually by the Society for Promotion of Engineering Education to a technical teacher chosen for accomplishment in technical teaching or actual advancement of the art of such training. The award was bestowed on Dean Marston at the society's annual dinner at Ann Arbor, Mich., June 26. Dean Marston has been on the Iowa State College staff for 15 years, and organized the engineering experiment station of the college, one of the first two research institutions of its kind in the nation. In 1929 he served as president of the American Association of Land Grant Colleges and Universities and of the American Society of Civil Engineers.

E. H. Hatz has been elected chairman of the Milwaukee section of the American Institute of Engineers, assuming his duties July 1. Other officers elected are: Walter Richter, secretary-treasurer, and T. B. Jochem and H. W. Rubinstein, directors.

Col. David McCoach, Jr., recently retired engineer commissioner of the District of Columbia, and a member of the Washington Society of Engineers, was honored by the citizens of Washington at a testimonial dinner on June 19. The dinner was held in the ballroom of the Mayflower Hotel, and was attended by several hundred prominent members of both the civil and professional organizations of the Capital.

Some 600 persons attended the recent fifth-anniversary dinner of the Engineering Society of Detroit, which was held at the Detroit Yacht Club. Among the prominent guests were Sir Firoz Noon, foreign minister of India; Cyril H. Cane, British consul, and A. O. Bray, British vice consul. Harvey M. Merker, T. A. Boyd and Prof. A. H. Lovell were elected members of the board of directors for a three-year term starting July 1.

Among the 76 persons appointed June 13 by Governor J. M. Broughton of North Carolina, to serve on a state council for national defense are R. Getty Browning, of Raleigh, representing the North Carolina Society of Engineers; Blake R. Van Leer, of Raleigh, dean of the Engineering School of North Carolina State College, who was named to represent the state at large; and Ben Prince, of Hendersonville, chairman of the North Carolina State Highway and Public Works Commission, one of the members named to represent state agencies. James T. Anderson, industrial engineer of the North Carolina State Department of Conservation and Development, was named executive secretary of the Council, and T. S. Johnson, professor of engineering at North Carolina State College, was appointed director of civilian defense activities.

At a meeting of the North Carolina Water Works Association, held at Raleigh June 13, the following new officers were elected: W. O. Spence, Sanford, president; J. O. Davidson, Charlotte, vice-president; H. D. Fesperman, Albemarle, secretary-treasurer; and W. F. McKimmon, Raleigh, was made a member of the board of examiners.

George Koronski, Gogebic County, Mich. road engineer, was elected president of the Upper Peninsula Road Builders Association at its annual meeting held June 13. W. C. Veale, Keweenaw County road engineer, was elected vice-president, and T. S. Dundon, Luce County road engineer, secretary-treasurer.

Joe J. Rady, consulting engineer of Fort Worth, Tex., has been elected president of the Fort Worth chapter of the American Society of Civil Engineers. Mr. Rady succeeds F. J. Harkrider, city planning engineer, as president of the society.

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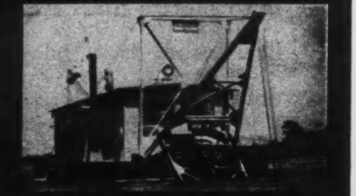

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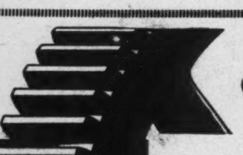

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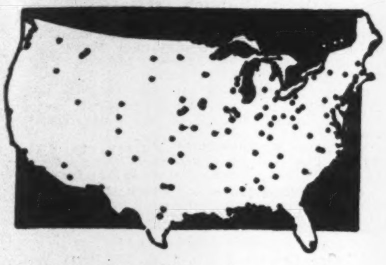
ELSIE EAVES, Manager SCOTT McLEOD, Statistician
(Daily service also available—Write for details)

Location of ENR Correspondents



Symbols and Abbreviations Include:

†	Federal Government
★	Project of $500,000 or over
ENR	Engineering News-Record
CD	Engineering News-Record Construction Daily

Projects—By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger; water supply, earthwork, waterworks, $15,000; other public works, $25,000; industrial buildings, $40,000; other buildings, $150,000.

Classes of Construction

(Named in order of Listing)

Water Supply
Sewers, Waste Disposal
Bridges, Grade Cross'gs
Streets & Roads
Earthwork, Waterways
Unclassified
Latin America
Public Buildings
Commercial Buildings
Industrial Buildings

Stages Reported

PROPOSED: (except Streets & Roads):

BIDS ASKED (new announcements only. For full calendar, see also preceding issues of ENR);

LOW BIDDERS: All low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: Except awards to low bidders previously reported in low bidder stage.

Dates shown are of issue in which last previous report was published.

WATER SUPPLY

PROPOSED WORK

Calif., San Francisco—P. Utilities Comn., City Hall, rejected bids June 17, laying 44 in. steel crosstown discharge main, WD 285, for City and San Francisco Co. CD 6/23—ENR 6/26 under LB.

Ky., Sebree—Filtration and settling plant, $15,000. L. S. Finch, 276 Century Bldg., Indianapolis, Ind. CD 5/28—ENR 6/5.

La., Shreveport—Exten. watermains. Over $15,000. T. L. Amiss, c/o owner, in charge.

Mo., Kansas City—A. C. Everham, dir. P. Wks., changing, replacing water mains, 15 St., vicinity railroad tracks and Blue River. $45,000. R. McKinley, City engr.

†N. J. Pedricktown—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., watermains Delaware Ordnance Depot, $35,000. WPA. G. R. Swinton, 930 Atlantic Ave., Atlantic City. WPA and owner's engr.

Pa., Scranton—Scranton Spring Brook Water Serv. Co., N. B. Lyle, mgr., 127 Jefferson Ave., Scranton, exten. c.i. watermains into upper East Mountain area, near here. Over $30,000.

S. C. Charleston—Comm. P. Wks., bids in 90 days, exten. WW into St. Andrews Parish, laying 12 in. main under Ashley River $90,000. J. E. Gibson, 14 George St., engr. CD 9/19.

Tex., Cuero—J. T. Newman, mayor, WW imprvs., distr. lines, pump. sta., reservoir, etc. $75,000. C. E. Miles, Cuero, engr.

Ont., St. Catherines—Jordan Wine Co. Ltd., Jordan, laying watermain from Jordan to here. $55,000. E. H. Darling, 36 James St. S. Hamilton, engr.

BIDS ASKED

Bids Asked After July 1

Tex., Velasco—E. F. Roeller, mayor, expansion, imprvs. WW sys., Geoco Proj. 521. $35,000. Garrett Eng. Co., 3504 Audubon St., Houston, Tex., engr. CD 3/5—ENR 3/13.

Bids Asked July 7

N. S., Halifax—R. M. McKinnon, c/o City, pumphouse, installing booster pump and incidental equip., $20,000; 1 electrically driven and 2 gasoline driven centrifugal pumps. About $45,000. H. W. Johnston, City Hall, Halifax, engr.

Bids Asked July 9

†Tenn., Knoxville—Tennessee Valley Auth., Knoxville, drilling water wells, Akin and Godwin Plants, near Columbia, Maury Co.; adv. ENR 7/3.

Bids Asked July 12

Tex., Albany — D. G. Curb, mayor, water supply main. Freese & Nichols, Capps Bldg., Fort Worth, engrs.

Bids Asked July 24

Fla., Vero Beach—H. W. Damerow, supt. P. Wks., City Hall, WW imprvs., installing 8 in. well, screen, turbine pumps etc.; adv. ENR 7/3.

LOW BIDDERS

†Ill., Scott Field (Belleville) — U. S. Eng., Courthouse and Customhouse, June 10, booster pump. station for water supply line, from Wolff Constr. Co., 913 Chestnut St., St. Louis, Mo., **$20,700.** CD 6/16—ENR 6/19.

N. Y., New York—Bd. Water Supply, G. J. Gillespie, pres., 346 Bway., June 24, Contr. 369, furnishing, del. bronze Venturi meter for Shaft 18, Downtake of Kensico-Hill View Tunnel, Delaware Aqueduct, from Simplex Valve & Meter Co., 68 and Upland Sts., Phila., Pa. **$38,667.** CD 6/5—ENR 6/12.

S. C., Lexington—U. S. Eng., Charleston, water distr. sys. for Lexington Co. Airport, from C. Y. Thomason Co., Greenwood. **$69,969.**

†Tex., San Antonio—U. S. Eng., Galveston, two 200,000 gal. steel water tanks, and 2 steel ground reservoirs, Kelley Field, from Chicago Brass & Iron Co., Fannin St., Houston, **$51,540.** Est. $90,000. Bids 6/18: awarded 6/23. CD 6/16.

†Va., Fort Monroe—Con. Q.M., May 27, steel water tank, piping, accessories, from Chicago Bridge & Iron Co., 1700 Walnut St., Phila., Pa., **$39,850.** CD 4/30—ENR 5/8.

CONTRACTS AWARDED

Conn., Bridgeport — Bridgeport Hydraulic Co., 835 Main St., 2 story, 35x40 ft. chlorinating plant, Easton Dam, Park Ave., Easton, near here, to E and F Constr. Co., 94 Wells St. Est. **$25,000.**

†Ill., Savanna—Con. Q.M., water supply line, distr. sys. for warehouses, to B. S. Andrus, Richmond and S. Concord Sts. S., St. Paul Minn. **$25,783.**

Ky., Winchester—Winchester Waterworks Co., 30x50 ft. filter building, 15x30 ft. chemical building, to Clarke Stewart & Wood, 640 W. 2 St., Lexington, **$43,500.** J. S. Watkins, McClelland Bldg., Lexington, archt.

N. C., Elkin—P. Gwyn, town clk. and treas., WW distr. facilities imprvs., **WPA. $102,236.** J. R. Poindexter, mayor. Bids 6/12. CD 6/6—ENR 5/15.

Pa., McKees Rocks—Robinson Twp. Auth., L. P. White, pres., Moon Run RD 1, McKees Rocks, water distr. sys. in Robinson Twp., **WPA. $50,000.** Edeburn Cooper Co., 2103 Law & Finance Bldg., Pittsburgh, engr.

Wash., Puyallup—Furnishing 5,624 ft. 14- to 18-in. c.i. pipe for water sys. imprvs., to H. G. Purcell Co., Colman Bldg., Seattle, **$18,056.** Bids 6/18.

Que., Montreal — Canadian Tube & Steel Products Ltd., 5765 Hamilton St., 24x24x22 ft. dup. rein.-con., brick pumphouse at Rolling Mill, St. Patrick St., to F. W. Ross, 5540 Woodbury Ave. **$90,000.**

SEWERS, WASTE DISPOSAL

PROPOSED WORK

Ky., Greendale — Commonwealth of Kentucky, Eng. & Constr. Div., R. C. Wyatt, ch. engr., completing plans, sewage disposal plant, to Greendale Reformatory. $35,000.

Ky., Hopkinsville—Commonwealth of Kentucky, Eng. & Constr. Div., bids soon sewage disposal plant, to Western State Hospital. $75,000. R. C. Wyatt, Frankfort, ch. engr. CD 6/20—ENR 6/27.

La., Shreveport—Sewers. Over $25,000. T. L. Amiss, supt. in charge.

Neb., Bellevue—Sanitary sewers, sewage disposal plant. $130,690. Application filed with WPA. Henningson Engr. Co., Standard Oil Bldg., Omaha, engr.

Neb., Carson City — $52,000 bond election July 6, sewage disposal plant.

Nev., Hawthorne—Voted $40,000 bonds, sewerage sys.

N. J., Brant Beach—Long Beach Twp., Twp. Hall, sanitary sewers, 47, 49, 51 and 53 Sts. $53,700. WPA. W. D. Cougle, 1102 S. Brad St., Trenton, WPA and owner's engr.

N. J., Plainfield—Excavating, sheeting, sanitary relief sewers. $55,000. WPA. J. H. Weitzen, Smith and Hobart Sts., Perth Amboy, WPA and owner's engr.

N. J., Trenton—Hamilton Twp., Twp. Hall, Greenwood Ave., vitr. clay sanitary sewers, manholes, Oldenhurst, DeLaval and White Horse Sts. $73,100. WPA. W. D. Cougle, 1102 S. Broad St., Trenton, WPA and owner's engr.

O., Loveland—Sanitary sewerage sys. and disposal plant. $300,000. Will apply for WPA funds. W. Marion, 914 Main St., Cincinnati, engr.

O., New Philadelphia—$100,000 bond election Aug. 12, storm sewers. A. Rosch, city engr.

O., Toledo—Bd. Comrs. Lucas Co. Bd., sanitary sewer to serve proposed new American Propeller Co. plant and Laskey-Jackman and Alexis Roads area. $300,000. B. G. Kesting, co. engr.

Tex., Cuero—Sanitary sewerage sys. exten., impvrs. $75,000. C. E. Miles, Cuero, engr.

Wash., Lowell—Lowell Sewer Dist., sewerage sys. $100,000. Parker & Hill, Smith Tower, Seattle, engrs.

Wis., Fond du Lac—Surveys sewage treatment sys., garbage disposal plant. J. Donohue Eng. Co., 608 N. 8 St., Sheboygan, engr. CD 5/13—ENR 5/15.

Wis., Monroe—Rebuilding, enlarging sewage treatment plant. O. H. Reclam, city engr.

BIDS ASKED

Bids Asked After July 1

Tex., Velasco—E. F. Roeller, mayor, expansion, imprvs. sanitary sewerage sys. $40,000. Garrett Eng. Co., 3504 Audubon St., Houston, engrs. CD 3/5—ENR 3/13.

LOW BIDDERS

Md., Towson—Comrs. Baltimore Co., Court House, June 23, installing c.i. and vitr. terra sewers, Dundalk, from J. Matricciana, 29 S. Exeter St., Baltimore, **$89,000.** CD 6/12—ENR 6/19.

N. Y., Brooklyn—Dpt. P. Wks., Municipal Bldg., New York, June 25, outlet diffusion pipes, Coney Island Sewage Treatment Works, Contr. 14, from National Excavation & Structures Corp., 10 E. 40 St., New York. **$39,370.** CD 6/16—ENR 6/19.

CONTRACTS AWARDED

N. J., Brant Beach—Long Beach Twp., Twp. Hall, sanitary sewers, Long Beach Blvd., Stanton and Farragut Aves. **WPA. $51,100.** W. D. Cougle, 1102 S. Broad St., Trenton, WPA and owner's engr.

N. J., Clark—Sheeting, vitr. tile sanitary sewers, manholes, Sect. 3. **WPA. $76,084.** J. H. Weitzen, South and Hobart Sts., Perth Amboy, WPA and owner's engr.

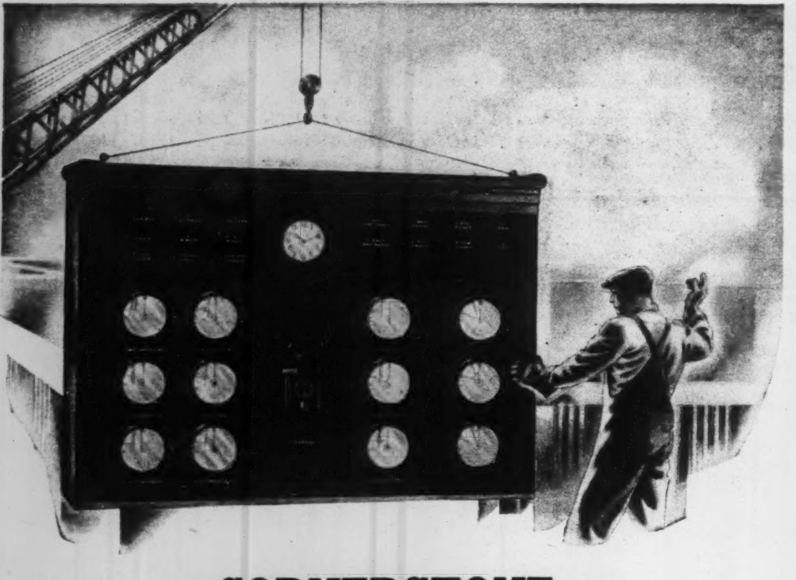
N. J., Plainfield—Sheeting, sanitary relief sewers, S. 2, W. 8, W. 9 Sts., Spooner and Central Aves. **WPA. $51,500.** CD 6/5—ENR 6/19.

N. J., Trenton—Hamilton Twp., Twp. Hall, Greenwood Ave., excavating, sheeting, sanitary sewer exten. **WPA. $57,500.** W. D. Cougle, 1102 S. Broad St., Trenton, WPA and owner's engr.

New York—Dpt. P. Wks., Div. Hys., Albany, shouldering, etc., hys. near Potsdam, over **$25,000;** surfacing, widening hys. near Ellenville and Napanoch, over **$25,000,** own forces.

Wis., Lake City—Sanitary and storm sewers. **WPA. $70,000.**

N. B., Chatham—Dpt. Natl. Defense For Air, Ottawa, Ont., installing sewers and watermains, No. 10 Air Observer's School, to Wheaton Brothers, Ltd., Downing St., Moncton, **$35,000;** furnishing 20,000 lin. ft. drainage pipe, to L. E. Shaw, Ltd., 8 Price St., Halifax, N. S.



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BRIDGES, GRADE CROSSINGS

PROPOSED WORK

Calif., Fresno — Fresno County Planning Comn., surveys underpass beneath tracks of Southern Pacific R.R. at Clinton Ave. Over $25,000. Project financed jointly by Southern Pacific R.R., 65 Market St., San Francisco, Fresno Co. and State.

★**Mo., Carruthersville**—Preliminary surveys, rein.-con., steel bridge over Mississippi River. $1,500,000. Sverdrup & Parcel, Railway Exch. Bldg., St. Louis, engrs.

N. J., Atlantic City—Atlantic Co., Courthouse, bridges throughout county. $6[illegible],000. WPA. G. R. Swinton, 930 Atlantic Ave., Atlantic City, WPA and owner's engr.

Okla., Nowata — Hy. Dpt., Oklahoma City, preliminary plans overpass over M., K. & T. Ry. Co. lines, near here. $35,000. V. T. Moon, Oklahoma City, engr.

Wash., Aberdeen—Replacing existing bridge with vertical lift type span, Huron St. $60,000. Seeking County aid. C. S. Watkins, City Hall, engr.

Wis., Fon du Lac—J. E. Murray, clk., 2 span, 117 ft., rein.-con. bridge over river at Western Ave. $25,000. Applied for WPA funds.

Alta., Edmonton—City Clerk, bids soon, redecking Dawson St. bridge. $25,000.

BIDS ASKED

Bids Asked July 11

Minnesota—State Hy. Dpt., St. Paul, Bridge 5891, 6 span, 234 ft. long, concrete deck girder viaduct over M.N. and S. Ry. Golden Valley Twp., S.P. 2752-09 (Trunk Hy. 55-188) FAGM 577C(1) (ON), Hennepin Co. J. T. Ellison, ch. engr. Over $25,000.

Bids Asked July 11

New Jersey—E. D. Sterner, comr. State Hy. Dpt., Trenton, elimination Riverview Drive grade crossing at D. L. & W. R. R., FAGM 31(1), Totowa Boro, Passaic Co., reconstructing underpass at Pennsylvania Reading Seashore Lines. East Red Bank Ave., Woodbury, Gloucester Co.

LOW BIDDERS

Calif., Felton — Supervs. Santa Cruz Co., Santa Cruz., June 23, two rein.-con. bridges, one 54 ft. long and other 46 ft. long, over Zayante Creek, north of here, from L. Cardwell Constr. Co., 530 Pacific Ave., Santa Cruz. **$25,070.** CD 6/2—ENR 6/5.

Connecticut—W. J. Cox, comr. State Hy. Dpt., Hartford, June 23, twin steel rigid frame bridge, 376 ft. approaches, Wethersfield, from D. V. Frione & Co., Inc., 87 Foxon Rd., New Haven, **$59,056.** CD 6/12—ENR 6/19, under Roads.

Conn., New Haven—City, City Engineer, Hall of Records, June 25, repairing, altering rein.-con. Grand Ave. Bridge, from De Felice Constr. Co., 51 Allston Ave., Alt. 2. **$94,098.**

Iowa—State Hy. Comn., Ames, June 24, bridges, Des Moines and Jackson Counties, from Jensen Constr. Co., 1527 12 St., Des Moines, **$141,628** and **$128,830** respectively*** bridge, Fremont Co., from Council Bluffs Constr. Co., Council Bluffs. **$32,026.** CD 6/13—ENR 6/19.

†**Washington**—Bureau Reclamation, Coulee Dam, June 23, painting Kettle Falls Railroad bridge over Columbia river, county bridge and railroad span over Kettle River gorge and railroad bridge over Kettle River near Boyds, Spec. 1516 D, from Pacific Bridge Painting Co., 55 New Montgomery St., San Francisco, Calif., **$25,989.** CD 6/9—ENR 6/12.

CONTRACTS AWARDED

Ill., Danville — Rein.-con. bridge on East North St. between Gobin and Collett Sts., to Danville Constr. Co., Danville. **$25,566.** CD 10/16—ENR 10/24.

Ia., Ottumwa — Chicago, Burlington & Quincy R. R. F. T. Darrow, ch. engr., 547 W. Jackson Blvd., Chicago, Ill., reconstructing bridge over Des Moines River, own forces. **$85,000.**

Kansas—State Hy. Dpt. at office Co. Clk., Winfield, bridges, FA 331 A, to H. J. Taylor Constr. Co., Salina, **$28,364*****FAS 136 A, Cowley Co., to C. E. Gray, Emporia, **$41,212** ***FAS 144 A, Barber Co., and FA 341 H, Kingman Co., to Banta Constr. Co., Harper, **$27,332** and **$42,460** respectively***FAS 341 H, Kingman Co., to Rhoades Constr. Co., Newton, **$40,691.** Grand total $180,059. Bids 6/11. CD 5/28—ENR 6/5.

N. Y., Falconer—Chautauqua Co. Hy. Dpt., 454 N. Work St., hy. bridge, Falconer-Frewsburg Rd., own forces. Est. **$25,000.** W. Chilson, c/o owner, acting supt. County Hys. CD 6/23—ENR 6/26.

Wyoming — State Hy. Comn., Cheyenne, I-beam span bridge, 1 treated timber bridge, 2 rein.-con. culverts, Johnson Co., to E. E. Peterson, 602 E. 15 St., Casper. **$27,642.** Bids 6/24. CD 6/16, under Roads.

Que., Ste. Adele—Dept. Pub. Wks., Quebec City, bridge over River aux Mulets, Montreal-Mont Laurier Hy., to Montminy & Gagnon, 13 St. Joachim St., Quebec City, about **$29,000.**

Que., Point St. Charles—Canadian National Rys., 360 McGill St., Montreal, concrete viaduct, to Kennedy Constr. Co. Ltd., 407 McGill St., Montreal, about **$150,000.** CD 6/4.

STREETS AND ROADS

BIDS ASKED

Bids Asked July 7

N. J., Millington—Passaic Twp., Twp. Hall, A or T on modified penetration surfacing 4,550 sq. yd., Long Hill Rd. J. J. Kintz, 382 Springfield Ave., Summit, engr.

Bids Asked July 8

Kansas—State Hy. Dpt., at office Co. Clk., Washington, stabilization and single asphalt surface treatment 5.919 mi. FA 211F, Parts 1 and 2, Washington Co.

N. J., Newton—Bd. Freeholders, Sussex Co., Courthouse, gravel surfacing 9,502 sq. yd. Big Spring Rd., Hardyston Twp. and 11,930 sq. yd. Mount Salem-Unionville Rd., Sects. 1 and 2, Wantage Twp. H. Snook, Courthouse.

★**Ohio**—State Hy. Dpt., Columbus, brick paving, asphaltic concrete resurfacing 0.393 mi. Sect. Minerva, SH 78, Stark Co. and Sect. Minerva SH 369, Carroll and Stark Counties, $18,700; grading, drainage structures, surface treated waterbound macadam paving, continuous steel beam bridge with concrete deck and substructure 0.142 mi. over Cowans Creek, Sect. 1, SH 451, Clinton Co., $34,720; bituminous road mix surface course, 2.983 mi. Sects. B1 and B2, SH 383, Columbiana Co., $22,250; grading, drainage structures, rein.-con. paving, concrete slab bridge with special concrete substructure 3.342 mi. Sects. C and R, SH 37 and U.S. 36 and 250, Harrison Co., $535,500; grading, drainage structures, placing new base, widening existing pavement asphaltic concrete surfacing 1.278 mi. Sects. South Point and M-3, SH 7, U.S. 52, Lawrence Co., $47,750; grading, resurfacing existing pavement, new waterbound macadam base with asphaltic concrete 0.374 mi. Sect. D, SH 56, Lucas Co., $14,900; oil aggregate resurfacing 0.978 mi. Sect. Barberton, SH 850, Summit Co., $8,440; grading, drainage structures, rein.-con. paving, single track through girder and steel beam underpass structure, single track through and deck plate girder underpass structure and continuous steel beam bridge with concrete deck and substructure over Mahoning River, Sect. U, Portage Co., and Sects. D and I, Trumbull Co., $655,300; bituminous treatment 44.99 mi. various sects. SH 134, 517, 135, 531, 173, 263, 875, 427 and 127, Allen, Putnam and Van Wert Counties, $33,813; 47.43 mi. SH 75, 376, 377, 762, 369, 86, 89, 500, 376, Carroll, Columbiana, Mahoning, Tuscarawas Counties, $76,418; 49.86 mi. SH 533, 426, 420, 302, 591, 318, 421, 423, 431 and 425, Defiance, Paulding and Putnam Counties, $35,145; 7.1 mi. Sects. A, Cumberland, B and C, SH 688, Guernsey and Noble Counties, $22,299; 37.85 mi. SH 544, 267, 524, 229, Hardin and Wyandot Counties, $40,943; 54.85 mi. SH 341, 342, 527, 588, 676, 376, 408, 409, 413, 547, 720, Holmes and Tuscarawas Counties, $44,065; 45.71 mi. SH 104, 108, 387, 389, 386, 390, Monroe, Noble and Morgan Counties, $72,625; 33.68 mi. Sects. 5, 261, 366, 363, 929, 665, 504, Pike and Ross Counties, $28,257.

Bids Asked July 10

†**D. C., Wash.**—Office H. J. Spelman, dist. engr., Public Roads Administration, Winder Bldg., grading, draining, calcium chloride on crusher run base course, tunnels, etc., 2.9 mi. Project 2Z1, Blue Ridge Parkway, Swain and Jackson Counties.

Bids Asked July 11

Minnesota—State Hy. Dpt., St. Paul, grading, concrete paving 10.6 mi. hy. between Graceville and point 2½ mi. south of Clinton, S.P. 0608-13 and -14 (Trunk Hy. 75-6), SN FAP 66(4) and 130(4); 16.4 mi. hy. between West Jackson Co. line and Junction Trunk Hy. 86, S.P. 3204-03, 04, 05 and 06 (TH 60-85), FAP's 523B(2), 523C(2), 523G(2); 11.4 mi. between point 1 mi. south of Wolverton and point 2 mi. northwest Brushvale, S.P. 8408-01 and 05 (TH 75-6), SN FAP's 343E(4) and 343C(3); grading, stabilized gravel surfacing 5.2 mi. between Lake Henry and Junction Trunk Hy. 55, S.P. 7301-01 (TH 4-4), and S.P. 3418-01 (TH 4-4), FAS 546E(2); grading, gravel backfill, gravel surfacing, bituminous and mineral aggregate surfacing 9.5 mi. between Nicollet and New Sweden, S.P. 5208-04 (TH 111-122); gravel surfacing, bituminous and mineral aggregate surfacing 7.5 mi. between Morris and East Stevens Co. line, S.P. 7504-01 (TH 28-28); 4.6 mi. between Miere Grove and Junction Trunk Hy. 52, S.P. 7301-09 (TH 4-4); bituminous material and mineral aggregate surfacing 2.4 mi. between 4 and 1 mi. west of Embarras, S.P. 6918-07; cement surfacing 3 mi. hy. between Harmony and South State line, S.P. 2316-05 (TH 139-79); 3 mi. FAP 454B(2); 2 box culverts between Lake Henry and S. Stearns Co. line, S.P. 7301-08 (TH 4-4), FAS 546E(2); grading 3.7 mi. P. 64-501-02, FAS 51A(1), S.R. 7, Redwood Co.; binder soil surfacing, graveling, bituminous surfacing, etc., 7.1 mi. P. 53-503-03, FAS 107A(2), S.R. 2, Nobles Co.; grading, gravel surfacing and Bridge 5990, 1.1 mi. P. 17-503-01, FAS 47C(1), S.A.R. No. 5, Cottonwood Co.; grading, gravel surfacing 2.7 mi. P. 69-512-01, FAS 9E(1), S.R. 4, St. Louis Co.; gravel surfacing, grading 2.3 mi. P. 69-514-05, FAS 867E(1), S.R. 7, St. Louis Co. J. T. Ellison, c/o owner, ch. engr.

New Jersey—E. D. Sterner, comr. State Hy. Dpt., Trenton, imprv. 2.84 mi. Brunswick Pike Rd., Sect. 1, from Mercer Co. line toward Lambertville, Hunterdon Co.

Bids Asked July 14

Calif., San Luis Obispo—Constructing curbs, gutters, plant mix surfacing. $25 000.

Bids Asked July 15

Indiana—State Hy. Comm., Indianapolis, paving 0.368 mi. SN-FA 71D (2); grading, 0.105 mi. SN-FA 71A (3), and structures 0.699 mi. SN-FA 21B (3) Clark Co.; paving, grading, structures 0.821 mi. FA-262D (2) Greene Co.; 0.583 mi. FA 728A Decatur Co.; 0.497 mi. Project 54B, Steuben Co.

Pa., Oil City—C. E. Hetrick, city clk., concrete on stone paving W. 3 St. between Mitchell and Cowell Aves. $25,000. Tentative date. B. B. Weber, city engr.

Pa., Pittsburgh—Comrs. Allegheny Co., R. G. Woodside, controller, Pittsburgh, road relocation and widening and bridge construction, Lawries Run and Rochester Rd. and Bridge 1, East Branch, Ross Twp., near here. Levi Burd Duff, County Office Bldg., Pittsburgh, engrs.

Bids Asked July 16

California—C. H. Purcell, engr. State Hy. Dpt., Sacramento, roadmix and imported borrow surfacing 2.4 mi. hy. Mendocino Co.; grading, plantmix surfacing 3.4 mi. Inyo Co.; sealcoat surfacing 34 mi. El Dorado, Yuba, Nevada and Placer Counties; grading, plantmix surfacing 8.5 mi. Mono Co.

†**Tenn., Knoxville**—Tennessee Valley Auth., Knoxville furnishing, selling, del., applying bituminous material for surfacing highways in Watts Bar Area., adv. ENR 7/3.

Bids Asked July 23

Louisiana—State Hy. Dpt., Baton Rouge, W. P. Foster, dir., bituminous surface treating 4.2 mi. Highland Rd., Route 63, S. P. 913-04-59, 9.2 mi. Baton Rouge-Amite River Bridge Hy., Routes 876 and 7, S. P. 913-04-66; 5.1 mi. Fred-Int. Route 3 Hy., Route 272, S. P. 913-04-67; 21.5 mi. Baton Rouge-Indian Mound Hy., Route 37, S. P. 913-04-68, all foregoing in East Baton Rouge Parish; 12.8 mi. Baton Rouge-Clinton Hy., Route 36, S. P. 913-04-69, East Baton Rouge and Feliciana Parishes, 23 mi. Baton Rouge-Clinton Hy., Route 36 S. P. 913-04-69, St. Tammany Parish.

Bids Asked

Kentucky—State Hy. Dpt., Frankfort, rejected bids rock asphalt surfacing 3.055 mi. Marion-Smithland Rd., SN-SP 70-70, Livingston Co. Will readvertise. CD 6/25 under LB—ENR 6/12 under BA.

LOW BIDDERS

†**Ala., Anniston**—Con. Q.M., Fort McClellan, June 25, roads, bridges, asphalt paving, concrete bridges, from Dunn Constr. Co., Chamber of Commerce Bldg., Birmingham, **$217,365.**

Calif., San Francisco—P. Utilities Comn., City Hall, June 24, repaving, imprv. streets, W. D. Contr. 299, from Pacific Pavements Co., Ltd., 85 Barstow St. **$46,225.** CD 6/16.

Colorado—State Hy. Dpt., Denver, June 24, imprv. 10.876 mi. hy. Mesa Co., from Knudsen & Burns Constr. Co., Inc., Estes Park, (Home office 3527 Bway., Kansas City, Mo.). **$374,597.** CD 6/13.

Connecticut—W. J. Cox, comr. State Hy. Dpt., Hartford, June 23, imprv. 25,712 ft. Willington, Ashford and Union, from D. V. Frione & Co., Inc., 87 Foxon Rd., Hartford, **$201,830** ***12,950 ft. Meriden, from Peter Mitchell, Inc., Hackett Bldg., Greenwich, $212,786*** 2,777 ft. Pomfret from Frank Shields, Inc., 91 Central St., Southbridge, **$42,613.** CD 6/12—ENR 6/19.

†**Idaho, Boise**—U. S. Eng., 628 Pittock Blk., Portland, Ore., June 20, paving streets, sidewalks, airport, from Morrison-Knudsen Co., 319 Bway., Boise. **$36,581.** CD 6/16.

★**Iowa**—State Hy. Com., Ames, June 24, imprv. 2.422 mi. Jackson Co., from E. M. Duesenberg, Inc., Clear Lake, **$33,689***** 0.662 mi. Jackson Co., from G. H. Lowe, 509¼ 3 Ave. S.E., Cedar Rapids, **$160,606***** 2.577 mi. Jefferson and Keokuk Counties and 7.538 mi. Keokuk and Washington Counties, from Concrete Materials and Constr. Co., 405 Granby Bldg., Cedar Rapids, **$29.490** and **$79,960** respectively*** 7.246 mi. Chickasaw Co., from F. Carlson, Decorah, **$168,525** ***2.422 mi. Jackson Co., from J. S. McLaughlin, 710 Walnut Bldg., Des Moines, **$71,815*****0.457 mi. Plymouth Co., from Jensen and Krage, 209 Wright Bldg., Sioux City, **$26,529.** CD 6/13—ENR 6/19.

★**Kentucky**—State Hv. Dpt., Frankfort, June 20, from Lehman-Roberts Co., Lexington, imprv. 12.894 mi. Bourbon and Fayette Counties, **$89.687*****from Breslin Constr. Co., Midwest Bldg., Louisville, 13.868 mi. Bullitt Co., **$44.833;** 10.822 mi. Magoffin Co., **$45,779;** 10.698 mi. Morgan Co., **$38,979;** 11.609 mi. Oldham Co., **$62,168*****from F. C. Gorrell & Sons, Russellville, 11.718 mi. Shelby Co., **$435,531*****from Corum & Edwards, Madisonville, 8.935 mi. Caldwell Co., **$88,031*****from N. E. Stone & Co., Madisonville, 3.208 mi. Calloway Co., **$34,430*****from Carey Constr. Co., Lexington, 8.31 mi. Christian Co., **$97,584;** 3.68 mi. McCracken Co., **$50,908*****from Codell Constr. Co., Winchester, 3.777 mi. Laurel Co., **$320,726*****from Gay-Coleman Constr. Co., Lexington, plant mix surfacing group projects, McCreary Co., **$26,710.** CD 6/4—ENR 6/12.

★**Maryland**—State Hy. Dpt., Baltimore, June 24, imprv. 1.650 mi. Contr. Wo-185-5-146. Worcester. Co. from Williams Constr.

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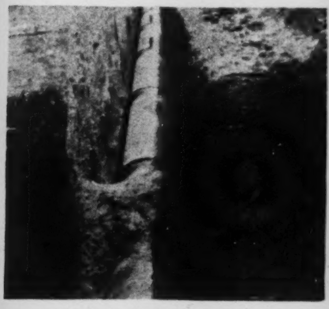

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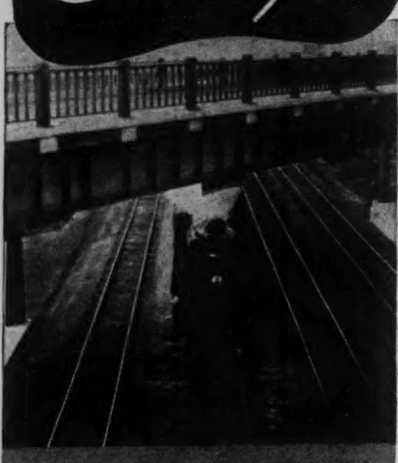

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STREETS, etc. (Low Bidders, Cont'd.)

Co., Middle River, **$405,829*****4.262 mi. Contr. Co 102-3-211, Caroline Co., from T. B. Gatch & Sons, 5937 Belair Rd., Baltimore, **$28,390** ***2.907 mi. Contr. SM-227-1-550, St. Mary's Co., from R. H. Houghton Inc., Odenton, **$29,734*****5 mi. Contr. P-460-511, Prince George Co. from Highway Eng. Co. 7 and T Sts. N.E., Wash., **$41,817*****5.79 mi. Contr. C1-253-1-311, Carroll Co., D. C., from Thomas, Bennett & Hunter, Westminster, **$186,505***** 7.39 mi. Contr. A 329-611, Alleghany Co., from Cumberland Contg. Co., Cumberland, **$340,660.** CD 6/18.

†Mass., Falmouth—Con. Q.M., Camp Edwards, June 24, roads, drains, from M. F. Roach & Sons, Inc., 55 Spring St., East Bridgewater, **$211,469,** CD 6/19.

New Jersey—E. D. Sterner, comn. State Hy. Dpt., Trenton. June 20, imprv. 5.76 mi. Burlington Co., from Joseph Rafferty, 1821 Bryn Mawr Ave., Haddon Heights, **$36,413.** Rejected bids 6/20, imprv. 1.767 mi. Hunterdon Co., will readvertise. CD 6/3—ENR 6/5.

N. Y., New York—President Manhattan Boro, Municipal Bldg., June 23, repaving Madison Ave. from Venetian Contg. Co., Ryawa Ave. and Bareto St., **$44,930.** CD 6/16—ENR 6/19.

South Dakota—State Hy. Comm., Pierre, June 24, imprv. 11.767 mi. Fall River Co., from Platte Valley Constr. Co., Grand Island, Neb., **$75,299*****2.035 mi. Custer Co., from Chaulk and Birdsall, Rapid City, **$40,603***** 2.431 mi. Pennington and Custer Counties, from Northwestern Engr. Co., Rapid City, **$67,387*****17.241 mi. Hutchinson and Turner Counties, from J. W. Craig Co., 1814 N.E. California St., Minneapolis, Minn. **$51,148.** D 6/11—ENR 6/19.

Tennessee—State Hy. Dpt., Nashville, June 20, oiling farm to market roads, Inv. ER-T44ps-5818 and 5819, from Interstate Constr. Co., 3rd Natl. Bank Bldg., Nashville, **$67,344** and **$84,875** respectively***Inv. ER-T44-ps-5820 and 5821, from Eller & Olsen, 32 Ave. N., Nashville, **$167,622** and **$176,910** respectively.

Wash., Seattle — City, June 19, removing street car tracks and paving 1 Ave. S. and Atlantic St., from Northwest Constr. Co., 3950 6 Ave. N.W., **$65,094** est. $65,264; 10 Ave. N, Roanoke St., Harvard Ave., from Argentieri & Colarossi, 1819 Weller St., **$41,870,** est. $40,726. C. L. Wartelle, County-City Bldg., engr.

†Alaska, Sitka—U. S. Eng., Central Bldg., Seattle, Wash., June 23, clearing, grading, draining, surfacing 5 mi. access road to Naval Air Base, from L. Coluccio, 1642 Lane St., Seattle, Wash., **$50,155.**

CONTRACTS AWARDED

Calif., Glendale—Grading, asphaltic concrete paving, Kenneth St., to P. K. Akmadzich, P. O. Box 454, Sunland, **$65,182.**

Calif., Sacramento—Bd. Supervs. Sacramento Co., imprv. 7,800 lin. ft. Jibboom and N. B Sts., to J. R. Reeves, P. O. Box 1072, **$25,576.** Bids 6/23. CD 6/17.

Calif., San Francisco—Stoneson Bros., Sloat Blvd., asphaltic concrete paving, vitr. sewers, curbs, gutters, streets Stonecrest subdivision, to Fay Imprvt. Co., Phelan Bldg., **$51,000.**

Delaware—State Hy. Dpt., F. V. duPont, chn., Dover, surface treating 154 mi. Contr. 775, New Castle and Kent Counties, and 106 mi. Contr. 776, Sussex Co., to Hatteras Oil Co., Lexington Bldg., Baltimore, Md., **$37,783** and **$47,371** respectively. Bids 5/20. CD 5/6—ENR 5/8.

Ill., Argenta—Macon Co., Decatur, 6 mi. blacktop surfacing to Earl Walker Co., Sullivan, **$25,000.**

Ill., Belleville — Bd. Supervs. St. Clair Co., Courthouse, grading 2.363 mi. Sect. 180 A-MFT, 2.9022 mi. Sect. 176 A-MFT, 3.0127 mi. Sect. 174 A-MFT and 2.9998 mi. Sect 175 A-MFT, to Tritt Bros. Constr. Co., Belleville Natl. Bank Bldg., **$62,799.** Bids 6/4. CD 5/27.

Kansas—State Hy. Dpt. at office Co. Clk., Columbus, imprv. 3.371 mi. Cherokee and Crawford Counties, to Reno Constr. Co., Inc., Merriam, **$36,516.** Bids 6/7, awarded 6/10. CD 5/28.

Kansas—State Hy. Dpt., at office Co. Clk., Goodland, imprv. 9.237 mi. Sherman Co., to M. W. Watson, 1304 National Bank of Topeka Bldg., Topeka, **$55,606.** Bids 6/13, awarded 6/21. CD 6/3—ENR 6/5.

Kansas—State Hy. Dpt. at office Co. Clk., Oskaloosa, imprv. 2.936 mi. Leavenworth Co. and 4.615 mi. Jefferson Co., to Reno Constr. Co., Merriam, **$33,121** and **$57,222** respectively ***4.844 mi. Atchison Co., to T. F. Marbut, Emporia, **$42,007.** Grand total $132,350. Bids 6/7, awarded 6/21. CD 6/4—ENR 6/12.

Kansas—State Hy. Dpt. at office Co. Clk., Winfield, imprv. 1.442 mi. Rice Co. and 6.273 mi. Rush Co., to H. J. Taylor Constr. Co., Salina, **$42,321** and **$29,951** respectively***2.888 mi. Kingman Co., to C. A. Tucker, Ottawa, **$80,393*****1.431 mi. Rice Co. and 2.87 mi. Kingman Co., to Jones Constr. Co., Emporia, **$29,032** and **$44,312** respectively***8.469 mi. Cowley Co., to Mike Haase, 2027 Swope Parkway, Kansas City, Mo., **$74,715*****7.407 mi. Harney Co., to J. H. Shears & Son, Hutchinson, **$79,020***** 4.322 mi. Cowley Co., to A. G. Sherwood Constr. Co., Independence, **$65,560.** Grand total $445,304. Bids 6/11, awarded 6/21. CD 5/28—ENR 6/5.

†Ky., Desda—U. S. Eng., Courthouse, Nashille, Tenn., June 19, 4 mi. road from Desda to proposed Wolf Creek Dam on Cumberland River, to Codell Constr. Co., Winchester, **$360,985.** CD 6/6—ENR 6/12.

Mississippi—State Hy. Comm., Jackson, imprv. 4.534 mi. Pike and Amite Counties to S. B. Boyd, Columbia, **$52,141,** est $150,000; 5.406 mi. Tallahatchie Co., to W. D. Cook, Forest, **$169,136,** est. $200,000. Bids 6/24, awarded 6/24. CD 6/12—ENR 6/19.

†N. H., Manchester—U. S. Eng., Boston, Mass., roadways, drains, Air Corps Cantonment, to Grand View Nurseries, 6 Grandview Ave., M't. Vernon, N. Y. **$44,537.**

N. J., Elizabeth—Grading, trap block paving, sand cushion, guttering, curbing, WPA. **$62,362.** J. H. Weitzen, Smith and Hobart Sts., Perth Amboy, WPA and owner's engr.

†N. J., Fort Monmouth—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., grading, rein.-con surfacing, Riverside Ave. and regrading for pistol range, **WPA.** **$52,087.** W. D. Cougle, 1102 S. Broad St., Trenton. WPA and owner's engr.

N. J., Hammonton — Grading, gravel surfacing, **WPA.** **$56,500.** G. R. Swinton, 930 Atlantic Ave., Atlantic City, WPA and owner's engr.

N. J., Montclair—Grading, curbing, penetration surfacing, **WPA.** **$73,500.** J. B. Hayden, Town Hall, WPA and owner's engr.

N. J., Mt. Holly—Burlington Co., Courthouse, surface treatment roadway, gravel shoulders 5 mi. Wrightstown Browns Mills Rd. **WPA.** **$75,818.** W. D. Cougle, 1102 S. Broad St., Trenton, WPA and owner's engr.

N. J., Teaneck—Grading, bituminous penetration macadam paving, curbing, sidewalks, to M. L. Raymond, Bogart Pl., Bergenfield, **$40,288.**

N. J., Trenton—Dpt. Conservation and Development, State House, grading, gravel fire roads, ditches, **WPA.** **$59,500.** G. R. Swinton, 930 Atlantic Ave., Atlantic City, WPA and owner's engr.

N. Y., Jamestown—Jamestown Municipal Airport Comn., D. H. McGeorge, secy., City Hall, excav., grading, bituminous materials stone or concrete surfacing hy. from N. Main St. exten. to municipal airport, own forces (Dpt. P. Wks.- **$25,000.** C. J. Strandburg, city engr.

★**N. Y., New York**—Port of New York Auth., 111 8 Ave., F. C. Ferguson, chn., paving, steel bent sect. north tube Lincoln Tunnel and New York Plaza, east of 11th Ave., to Geo. J. Atwell Foundation Corp., 45 Rockefeller Plaza, **$938,392.** CD 6/4—ENR 6/12 under LB.

North Carolina—State Hy. & P. Wks. Comn., Raleigh, imprv. roads, Martin Co., **$86,500;** Jackson Co., **$108,470, WPA.** W. V. Baise, c/o owner, Raleigh, **engr.**

O., Dayton—Bd. Comrs., Montgomery Co., Dayton, repairing, patching roads, to E. Kammer, N. Gettysburg Ave. **$53,000.** V. C. Smith, co. engr.

Tenn., Nashville—T. L. Cummins, mayor, imprv. streets and alleys, **WPA.** **$100,000.** F. Beasely, city engr.

Tenn., Nashville—L. Hickman, judge, Davidson Co., Nashville, farm-to-market-roads, **WPA.** **$398,943.**

Tex., Kenedy—Karnes Co., c/o Co. Judge, constructing lateral roads, force account. **$125,000.**

Wash., Colfax—Whitman Co. Comn., Colfax, imprv. 2.85 mi. Mockonema-Diamond Rd., to C. E. Oneal, Ellensburg, **$42,365.** Bids 7/21. CD 6/12.

Wisconsin—State Hy. Comm., Madison, imprv. 5.066 mi. Portage and Marathon Counties, to Carl and Joe Theiler, Tomahawk, **$152,832.** CD 6/19—ENR 6/26, under LB.

Wisconsin — State Hy. Comm., Madison, imprv. 1.325 mi. Grant Co., to Henry Boulanger, Casco, **$31,811.** Bids 5/13. CD 5/15—ENR 5/22, under LB.

Wis., Eau Claire—Imprv. streets, **WPA.** about **$90,000.**

Wyoming—State Hy. Comn., Cheyenne, imprv. 10.859 mi. Johnson Co., to J. M. Keahey, Buffalo, **$139,200*****10.83 mi., 3.03 mi. and 4.115 mi. Sublette Co., to Blanchard Brothers, Campstool Route, Cheyenne, **$68,973** ***60.06 mi. Lincoln Co., to Northwestern Eng. Co., Rapid City, S. D., **$123,753*****6.593 mi. Weston Co., to J. J. Dooling, 1133 Oneida St., Denver, Colo., **$99,895*****maintenance shop and storage building to C. Schmerber, Cody, **$43,463.** Grand total $475,284. Bids 6/24. CD 6/16.

Alta., Drumheller — Grading, graveling, crushed gravel and sand topping Third Ave., Center and First Sts., to F. R. Gibb, Airport, Claresholm. **$30,000.** E. Ashburner, City Hall, Medicine Hat, engr.

B. C., Squamish—4 mi. road construction, to Dawson Wade Co. Ltd., 775 Clark St., Vancouver. **$43,515.**

Ont., London—Middlesex Co., asphalt paving 2¾ mi. road, Appin to Hy. 2, to Towland Constr. Co. Ltd., 294 Dundas St., about **$45,000.** W. R. Smith, c/o owner, engr.

Ont., St. Thomas—Suburban Area Road Comn., 4 in. surfacing 2 mi. Fingal Rd., to Industrial Constr. Co., Talbot St. Est. **$30,000.** Awarded 6/24. F. A. Bell, Court House, engr.

Quebec—Dpt. Roads, Quebec City, bituminous treating 35 mi. Eastern Twps, Dist. 35, to P. E. Maillet, 5590 Dunmore Ave., Montreal.

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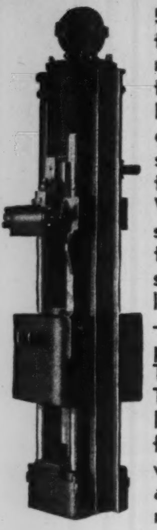

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EARTHWORK, WATERWAYS

PROPOSED WORK

Iowa — Winneshiek Co. Soil Conservation Dist., Decorah, soil conservation, water conservation, dams, drainage.

Tex., Cuero—J. T. Newman, mayor, drainage project, ditching, embankments, levees, etc. $187,000. C. E. Miles, Cuero, engr.

Tex., Raymondville—State, Fish, Game & Oyster Comn., c/o A. E. Wood, chn., Austin, Padre Island Pass, near here, 11,800 ft. channel with 11,000 ft. cut through mud flats and 800 ft. through island, jetties with 300 ft. land work and 500 ft. sea work, etc. $75,000. Peurifoy & Patterson, Kingsville, engrs.

†Washington—U. S. Eng., 628 Pittock Blk., Portland, Ore., dredging Willapa River and harbor. $80,000.

†Washington—U. S. Eng., 628 Pittock Blk., Portland, Ore., maintenance dredging in Grays River. $2,000.

†Wash., Seattle—U. S. Eng., Central Bldg., maintenance dredging Puget Sound and tributary waters. $40,000.

†Alaska, Dutch Harbor—Navy Dpt., 18 St. and Constitution Ave., N. W., Wash., D. C., exten. bulkhead, filling, grading, Naval Air Station. $300,000.

BIDS ASKED

Bids Asked July 7

†California — Bureau Reclamation, Customhouse, Denver, Colo., deformed intermediate grade billet, hard grade billet or hard grade rail steel, for Central Valley Project, del. Friant.

Bids Asked July 8

†Tenn., Knoxville—Tennessee Valley Auth., Knoxville, structural steel for Buildings 3, 5, 6, 7 and 8, 9 and 10, Akin and Godwin Plants, near Columbia; adv. ENR 7/3.

Bids Asked July 18

†Miss., Gulfport—U. S. Eng., Mobile, Ala., dredging 1,500,000 cu. yd. Gulfport Ship Channel.

Bids Asked July 23

†California — Bureau Reclamation, Old Post Office Bldg., Sacramento, water tanks, reservoir, oil-storage tank, for Southern Pacific R. R. relocation, between Redding and Delta, Kennett Div., Central Valley Project, Spec. 973.

Bids Asked August 18

†California — Bureau Reclamation, Customhouse, Denver, Colo., main and station-service control equip., load and frequency control equip., switchboards, distr. switchboards, battery chargers, etc., in Shasta Power Plant, Central Valley Project, Spec. 972.

LOW BIDDERS

†Calif., Fort Baker—U. S. Eng., 401 Customhouse, San Francisco, boat basin, rock fill, Inv. 868-41-234, from Scheumann & Johnson, P. O. Box 822, Eureka. **$44,475.** CD 7/23—ENR 6/26.

★ **†Calif., Long Beach**—U. S. Eng., 751 S. Figueroa St., Los Angeles, June 24, dredging Los Angeles River from Standard Dredging Co., Central Bldg., Los Angeles, **$570,752.** CD 6/19—ENR 6/26.

★ **†Calif., San Diego**—Eleventh Naval Dist., foot of Bway., June 26, 3,500 ft. quay wall, Destroyer Base, with 200 ft. bridge over Cholas Creek slew, from M. H. Golden Co., Bank of America Bldg., **$445,445.** Dredging 192,000 cu.ft. adjacent to quay wall from Case Constr. Co., 109 San Pedro St., Los Angeles, **$61,440.** CD 6/12—ENR 6/19.

†Calif., Stockton—U. S. Eng., 208 Postoffice Bldg., Sacramento, June 24, 137,000 cu. yd. dredging, depositing material from Smith Canal, from Olympian Dredging Co., 525 Market St., San Francisco, at **22.15c.** per cu. yd., total **$30,345**. Est. $21,920. CD 5/28—ENR 6/5.

†Louisiana — U. S. Eng., foot of Prythania St., New Orleans, June 19, 11,714 lin. ft. wooden revetment on Mississippi River, below New Orleans, Penquemine Parish, from Jules Saunee, 1903 Gallier St., New Orleans, **$33,142.**

†New Jersey—U. S. Eng., 17 Battery Pl., New York, N. Y., June 25, dredging 101,000 cu.yd. all material except ledge rock from Woodbridge Creek, from A. M. Hazell, Inc., 117 Liberty St., New York, N. Y. **$23,458.** CD 5/27 — ENR 6/5.

†N. Y., Corning—U. S. Eng., Security Mutual Bldg., Binghamton, June 10, pump. plant, Cutler Creek Station, from Kushar Bros., Montvale, N. J., **$72,554.** CD 5/26—ENR 5/29.

N. Y., New York—Commissioner Dpt. Docks, Pier A, foot of Battery Pl., North River, June 25, dredging slip adjoining north side Pier 73, North River, Contr. 2274, from O'Brien Bros., Inc., 233 Bway. **$21,750.**

†N. Y., West Point—U. S. Eng., 17 Battery Pl., New York, June 23, repairing, exten. ramp, dredging, approach channel to ramp, from A. M. Hazell, Inc., 117 Liberty St., New York **$19,750.** CD 6/16—ENR 6/19.

†Ore., Astoria—U. S. Eng., 628 Pittock Blk., Portland, June 23, dredging Young's Bay adjacent to Tongue Point Naval Air Station from General Constr. Co., 3840 Iowa St., Seattle, Wash., **$135,200.**

†South Carolina—Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., hydraulic dredging for Naval Air and Seaplane Facilities for Charleston Navy Yard, Charleston Co., from Hill Dredging Co., 5601 Atlantic Ave., Ventnor, N. J. **$132,000.**

†Tenn., Memphis—U. S. Eng., P. O. Box 97, Memphis, superstructure Cypress Creek pump. station, from E. O. Korsmo Constr. Co., Porter Bldg. **$128,829.** CD 5/27—ENR 6/5.

†Washington—Bonneville Project, P. O. Box 3557, Portland, Ore., June 23, disconnecting switches for substations, Walla Walla, Inv. 1978, from Railway and Industrial Co., Greensburg, Pa., **$153,800.** CD 6/10—ENR 6/12.

Wash., Port Angeles—H. W. Davis, port mgr., June 23, 35,000 cu. yd. dredging for log pond, from Angeles Gravel & Supply Co., Laurel and Railroad Sts., **$56,720.** CD 6/18.

CONTRACTS AWARDED

★ **†Calif., Los Angeles**—U. S. Eng., 751 S. Figueroa St., Los Angeles, Santa Fe Dam, to Morrison-Knudsen Co., J. F. Shea Co., Inc., Ford J. Twaits & Winston Bros., 411 W. 5 St., Los Angeles. **$8,837,199.** Bids 6/12, awarded 6/24. CD 6/13—ENR 6/19.

†Fla., Lake Worth—U. S. Eng., P. O. Box 4970, Jacksonville, dredging turning basin and inner channel, Lake Worth Inlet, to Arundel Corp., Pier 2 Pratt St., Baltimore, Md., **$58,788.** Awarded 6/21.

N. J., Long Branch—Bd. Commere & Navigation, State House, Trenton, 26,300 sq. yd. stone paving bank for bulkhead on Atlantic Ocean. **WPA. $64,247.** W. D. Cougle, 1102 S. Broad St., Trenton, WPA and owner's engr.

★ **†N. Y., Binghamton**—U. S. Eng., Security Mutual Bldg., flood protection, Sect. 4, to L. B. Strandberg & Son, Inc., 608 S. Dearborn St., Chicago, Ill. **$957,748.** CD 6/11—ENR 6/12.

†Pa., Oakmont—U. S. Eng., Federal Bldg., Pittsburgh, dredging Allegheny River 9 mi. and Sycamore Island, to Dravo Corp., Neville Island, Pittsburgh, **$20,655.** Bids 5/31. CD 5/21.

Tex., San Antonio—C. K. Quinn, mayor, excavating approx. 1,194,000 cu. yd. material from site of new airport, to Briggs, Killam Co., Seguin Rd., **$138,600.** Est. $145,000. J. W. Beretta Engineers, Inc., Nat. Bank Commerce Bldg., Matthews & Kenan, Smith Young Tower, W. E. Simpson, Milam Bldg., H. R. F. Helland & F. Drought, Frost Bldg., engrs.

Wis., Chippewa Falls—Chippewa Co., imprv. lakes, streams, **WPA. $75,000.**

Wis., Shell Lake—State of Wisconsin, Madison, diversion canal and control works to divert flood waters from Clam River, **WPA.** Over **$30,000.** CD 10/3—ENR 10/10.

Wis., Waupaca—Waupaca Co., imprv. lakes, streams, **WPA. $60,000.**

UNCLASSIFIED

PROPOSED WORK

★ **†Calif., Lemoore**—FLYING SCHOOL—U. S. Eng., 1 and Douglas Sts. N.W., Wash., D. C., A.C. Advanced Twin Engine Flying School, barracks, supply rooms, chapel, officers quarters, fire station, hospital, etc., 9 mi. southwest of here. $1,732,500.

†Calif., Merced—LANDING STRIPS, etc.—U. S. Eng., 208 Postoffice Bldg., Sacramento, landing strips, runways, taxiways, warm-up aprons, Flying School, near here.

Calif., Palmdale — AIRPORT — Palmdale Irrigation Dist. airport, paved runways, etc., near here. $350,000. Parkinson & Parkinson, 434 Title Insurance Bldg., Los Angeles, archts. E. L. Ellingwood, 124 W. 4 St., Los Angeles, engr.

†Calif., Stockton—LANDING STRIPS—U. S. Eng., 208 Postoffice Bldg., Sacramento, completing specifications landing strips, runways, taxiways, warm-up aprons, completing plans temporary buildings, utilities, Flying School, near here. CD 5/22—ENR 5/29.

Colo., Montrose—SWIMMING POOL—H. B. Vasey, city mgr., swimming pool. $25,000.

★ **Fla., Jacksonville**—AIRPORT—Preliminary plans Municipal Airport 2. $750,000 CAA will finance. City to supply land.

†Fla., Sebring — FLYING SCHOOL — U. S. Eng., 1 and Douglas Sts. N.W., Wash., D. C., A.C. Basic Training School.

Idaho, Nampa—TRACKAGE—Union Pacific Ry. Co., B. H. Prater, ch. engr., 1416 Dodge St., Omaha, Neb., 2 mi. additional trackage, expansion icing plant. $75,000.

Ia., Waterloo—PARKING AREA—K. Matthews, city clk., parking area, downtown dists. $40,000.

UNCLASSIFIED (Proposed Work, Cont'd.)

Kan., Mound City—ATHLETIC FIELD—Athletic field, stadium, fair buildings. $60,000.

Kentucky — TRANSMISSION LINE — Kentucky and West Virginia Power Co., Pineville, high tension electric transmission line across Perry, Leslie, Clay, Knox and Bell Counties, from Hazard to Pineville.

†**Miss., Greenville** — SPUR TRACK — U. S. Eng., P. O. Box 60, Vicksburg, 1½ mi. spur track from Y. & M. V. Rd. to new air base field. $26,000.

★†**Mo., Kansas City**—LANDING FIELD—U. S. Eng., 1 and Douglas Sts. N.W., Wash., D. C., landing field imprvs. $2,500,000.

Mo., Springfield—FOUNTAIN—H. B. Carr, mayor, public square fountain. $25,000.

Nebraska—RURAL LINES—Consumers Public Power Dist., Columbus, 28 mi. transmission lines, Dodge, Platte, Boone and Nance Counties. $25,000.

†**N. J., Long Branch**—RECREATIONAL FACILITIES—Federal Security Agency, 25 and E Sts. N.W., Wash., D. C., recreational facilities for defense workers. $60,000.

†**N. J., Pedricktown** — LANDSCAPING — Fourth Naval Dist., Navy Yard, Phila., Pa., landscaping, excavating, grading, paths, walls, etc. Delaware Ordnance Depot. $62,500. WPA. G. R. Swinton, 930 Atlantic Ave., Atlantic City. WPA and owner's engr.

N. Y., Brooklyn—RECONSTRUCTING CAR TRACKS—Bd. Transportation, 250 Hudson St., New York, reconstructing surface car tracks, etc., drainage equip. for Line A, Fulton St.

N. Y., Jamestown—LIGHTING SYSTEM—Bd. P. Utilities, City Hall, T. V. McKee, secy., street lighting sys., E. 2 and N. Main Sts., Foote, Fairmount, Fluvanna and Forest Aves. Over $25,000. C. O. Johnson, c/o owner, supt.

N. Y., Sinclairville—GRADING, etc.—Cassadaga Valley School Dist., Sinclairville, defeated $45,000 bonds, grading, landscaping school grounds, etc., athletic field, etc. $45,000. F. A. Freeburg, 1105 W. 3 St., Jamestown, archt. CD 6/10—ENR 6/19.

N. C., High Point—PARKS—W. F. Bailey, dir. Parks & Recreation, E. M. Knox, city mgr., filed application with WPA for gr. 4 recreation parks, courts, playgrounds, community centers, etc. $100,000.

N. C., Kinston—AIRPORT—W. F. Stanley, mayor, airport, 640 acre site, northwestern section city. $300,000.

★**O., Akron** — AIRPORT —Imprv. airport, runways, underground shops, hangars, gasoline storage warehouse. $1,700,000. Applied for WPA funds. W. F. Peters, dir. Pub. Serv.

O., Bellefontaine—LOCOMOTIVE STALLS—New York Central R.R. Co., G. H. Harris, ch. engr., LaSalle St. Station, Chicago, Ill., bids in about 30 days, exten. 5 locomotive stalls from present engine house northward to southside large machine shop building, etc. $102,000.

Oklahoma — OIL PIPELINE — Texas Co., Philtower Bldg., Tulsa, surveys 64 mi. 6 in. oil pipeline from oil field, near Apache to bulk terminals, Oklahoma City, Caddo Co. $175,000.

Okla., Madill — PIPELINE — Pure Oil Co., Madill, preliminary surveys 38 mi. 6 in. oil pipeline from Cumberland to Fitts field, Ada. $45,000.

Pennsylvania—PARK—Dpt. Forests & Waters, Harrisburg, developing 10,000 acre state park, incl. roadways, walks, grading, landscaping, etc., on North Mountain, in Luzerne, Sullivan and Wyoming Counties. $150,000.

†**Pa., Connellsville**—HANGAR, etc.—U. S. Eng., 1 and Douglas Sts., N.W., Wash., D. C., 120x200 ft. hangar, gasoline and oil dispensing sys., night lighting installation. $250,000.

Pa., Edinboro — COLLEGE GROUND IMPROVEMENTS—General State Auth., 2nd and Locust Sts., Harrisburg, and Edinboro State Teachers College, Edinboro, imprv. teachers college grounds, incl. grading, excav., placing topsoil, walks, etc. $26,430.

Pa., Johnstown—GAS MAIN—Pennsylvania Electric Co., W. C. Sontum, operating mgr. in charge, Johnstown, 6 in. gas main, west side Strayer St., 4 in. main from Chandler to Decker Aves., etc. $25,000-$30,000.

Pa., Johnstown — GOLF COURSE — F. I. Connor, city councilman in charge, expansion and imprv. municipal golf course, expansion present 9 hole unit to full 18 hole course, clubhouse, grading, landscaping, etc. Over $25,000. H. Lee Wilson, city engr.

S. D., Madison—AIRPORT, etc.—G. H. Simpson, city aud., airport, park and recreational construction. $50,000.

Tex., Kermit — SWIMMING POOL — Bd. Educ., plans by Haynes & Strange, 415 Myrick Bldg., Lubock, rein.-con. outdoor swimming pool. $40,000.

★†**Tex., San Antonio** — FLYING FIELD — U. S. Eng., Citizens Bank Bldg., Denison, runways, taxi strips, hangars, shop, lighting, ground development, for A. C. Cadet Flying School. $1,842,500; building facilities, Army Air Corps Basic Flying School $2,124,383.

Wash., Ellensburg—RUNWAYS—Survey 1,000 ft. runway extens., airport. Over $25,000. F. L. Breckon, City Hall, engr.

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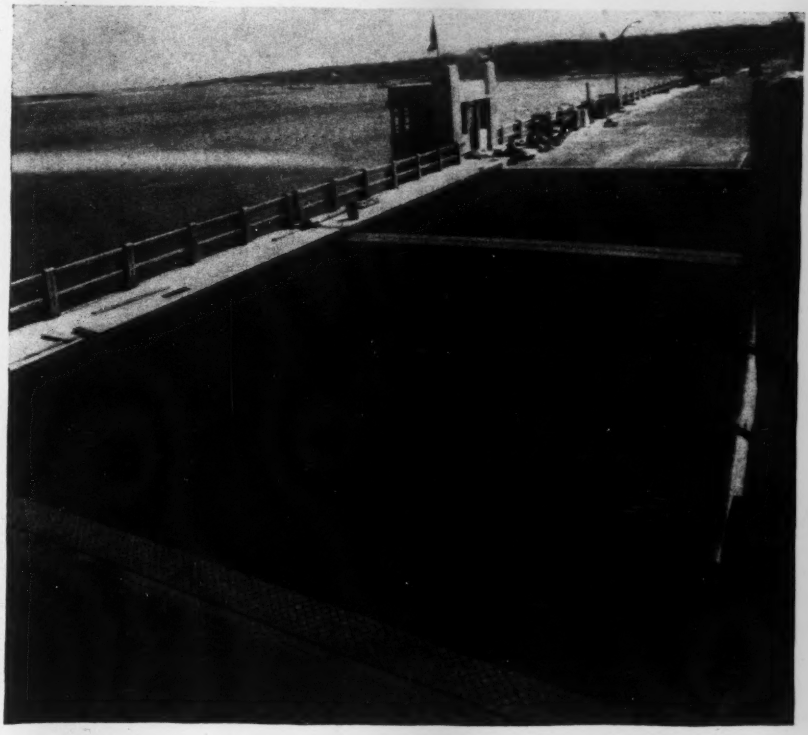

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Consultant: *Morris Goodkind*
County Engineer: *Otis R. Seaman*
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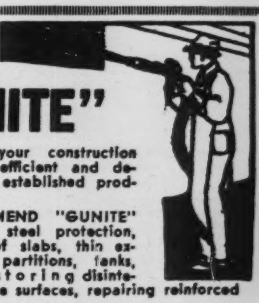

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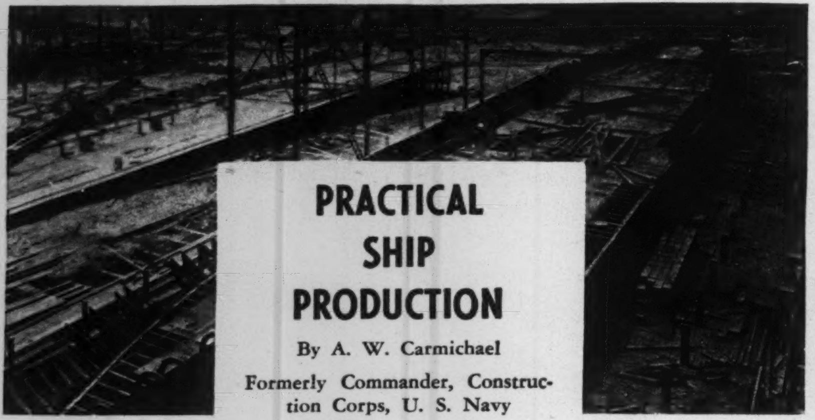

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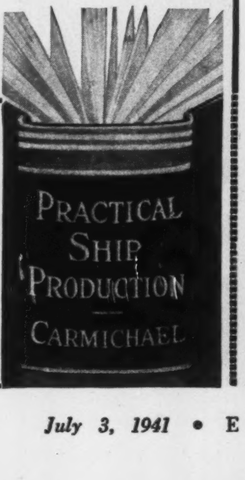

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UNCLASSIFIED (Proposed Work, Cont'd.)

★**Wash., Seattle**—DRY DOCK—Todd Seattle Dry Docks, R. J. Lamont, pres., 1801 16 Ave. S.W., intermediate type drydock. $1,000,000.

★†**Wash., Seattle**—PIER—Quartermaster Depot, 1519 S. Alaskan Way, 240x1000 ft., concrete, timber pier, 180x1000 ft. transit shed. $2,000,000. M. O. Sylliaasen, Bebb & Jones and L. Bouillon, 1519 S. Alaskan Way, archts. and engrs.

Wash., Spokane — AIRPORT — Surveys airport, 5,000 ft. runways, lengthening runways at Felts Field. Over $25,000. CAA.

Wash., Tokeland—POWER LINE EXTENSION — Grays Harbor Public Utility Dist., Aberdeen, power line exten. **$44,126.** R. W. Beck, c/o owner, engr.

†**Alaska, Unalaska**—AIR STATION CAMP—Navy Dpt., 18 St. and Constitution Ave., Wash., D. C., camp, Naval Air Station. $75,000.

†**Alaska, Unalaska**—RUNWAYS—Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., dredging seaplane runways, Naval Air Station. $150,000.

BIDS ASKED

Bids Asked July 7

N. Y., Fredonia—LIGHTING SYSTEM—Village Bd., T. Horton, trustee in charge, imprv., exten, street lighting sys. $25,000. CD 5/14—ENR 5/22.

Bids Asked July 8

Calif., San Francisco—RECONSTRUCTING TRACKS—Public Utilities Comn., City Hall, reconstructing tracks in Geary St. between 3 and 10 Aves. Municipal Railway Contr. 200, for City and San Francisco Co. Over $25,000.

Bids Asked July 10

West Virginia—RURAL LINES—Harrison Rural Electrification Assn., Inc., 917½ W. Pike St., Clarksburg, 88 mi, rural lines, Barbour, Doddridge, Harrison, Tyler, Marion and Upshur Counties, Proj. West Virginia 1010 D-1 Harrison. Extended date. Gibbs & Hill, Inc., 600 N. 2 St., Harrisburg, **Pa.,** engrs. CD 5/18—ENR 6/19.

Bids Asked July 14

Calif., Stockton—STREET LIGHTING SYSTEM—Street lighting sys. with underground services, Highland Park Tract. $25,000.

Bids Asked

Calif., Lawndale—MAUSOLEUM—Hyman & Appleton, archts., 68 Post St., San Francisco, rein.-con. mausoleum addn. for Congregational Temple, Sherith Israel, c/o archts. $150,000.

★†**Miss., Columbus**—AIR CORPS PILOT TRAINING SCHOOL—U. S. Eng., 1 and Douglas Sts. N.W., Wash., D. C., A.C. pilot training school, barracks, day rooms, supply rooms, recreation and administration buildings, warehouses, officers quarters, etc. $4,200 000. CD 6/3—ENR 6/5.

★†**Okla., Enid** — FLYING SCHOOL — U. S. Eng., 1 and Douglas Sts. N.W., Wash., D. C., new basic flying school. **Approx.** $1,842,500. CD 6/24.

★†**Tex., Sherman**—FLYING SCHOOL—U. S. Eng., Citizens Bank Bldg., Denison, buildings for A.C. Basic Training School, barracks, hangars, repair shops, mess halls, hospital, etc., $1,900,000; runways, paving concrete apron, lighting sys., leveling, grading, drainage, $1,600,000; temporary buildings, $150,000.

LOW BIDDERS

Ariz., Phoenix—FUELING SYSTEM—U. S. Eng., 751 S. Figueroa St., Los Angeles, June 21, A. C. fueling sys., Phoenix Military Airport, from Flotation Systems, Inc., 4031 Goodwill Ave., Los Angeles, Calif. **$96,852.** CD 6/13.

†**Calif., Bakersfield**—HANGAR—U. S. Eng., 208 Postoffice Bldg., Sacramento, June 20, 1 A.C. hangar, control tower, Flying Field 2, Inv. 1105-41-278, from Trewhitt, Shields & Fisher, Pacific Southwest Bldg., Fresno. **$101,388.** Est. $107,000.

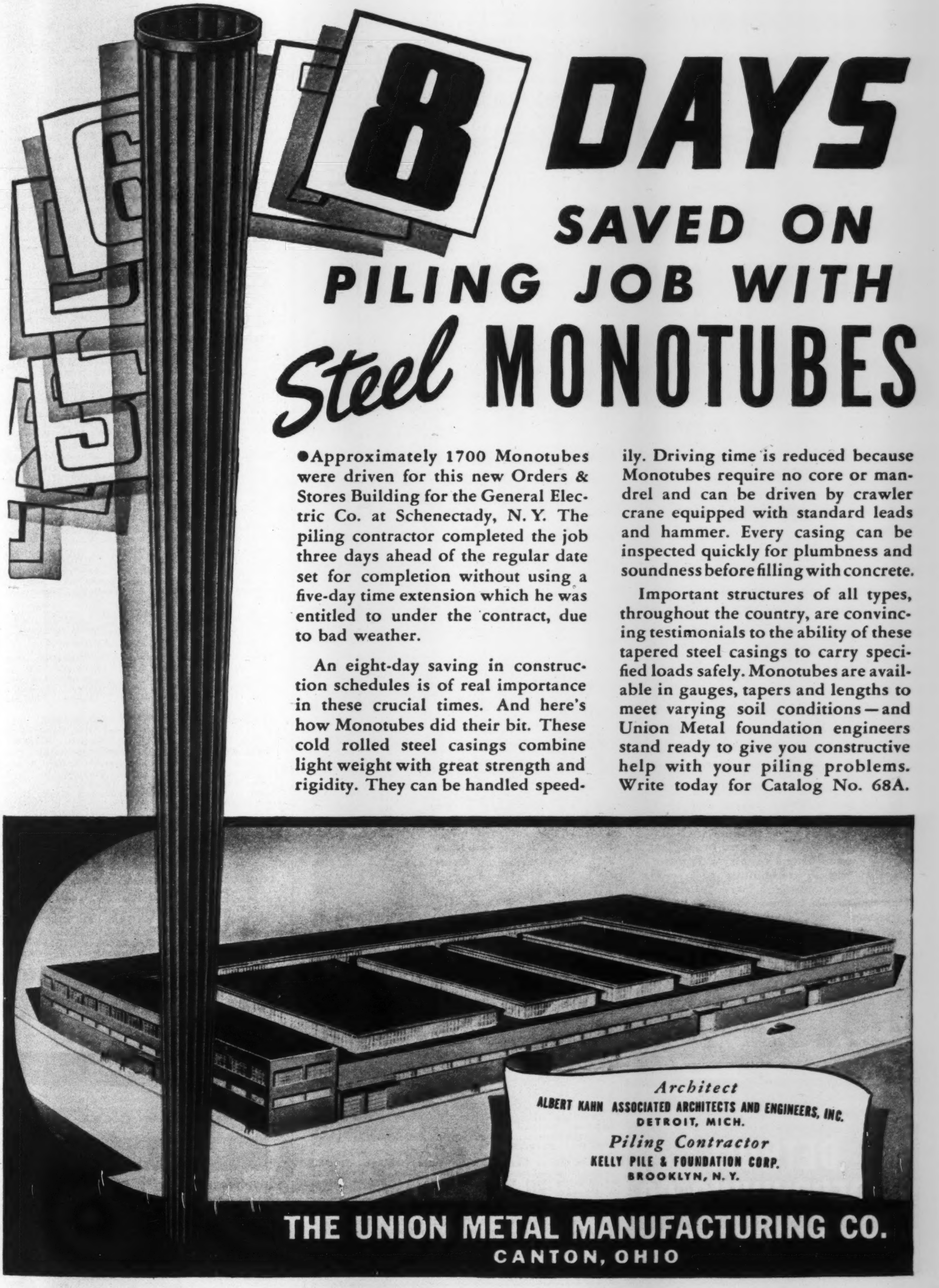
†**Calif., Fresno**—HANGAR—U. S. Eng., 208 Postoffice Bldg., Sacramento, A.C. hangar, control tower, appurtenant facilities, Fresno Air Base, Inv. 1105-41-277, from Trewhitt, Shields & Fisher, Pacific Southwest Bldg., Fresno. **$99,688.** Est. $107,000.

†**Calif., Mather Field**—HANGAR—U. S. Eng., 208 Postoffice Bldg., Sacramento, June 20, 1 A.C. hangar, control tower, appurtenant facilities, Inv. 1105-41-276, from Lawrence Constr. Co., 3511 E. Curtiss Park Dr., Sacramento. **$90,740.** Est. $107,000.

★†**Calif., Riverside** — RUNWAYS — U. S. Eng., 751 S. Figueroa St., Los Angeles, runways, March Field, from Matich Bros. and E. L. Yeager, Riverside, **$982,220.** CD 6/19.

★†**Fla., Tampa** — RUNWAYS — U. S. Eng., P. O. Box 4970, Jacksonville, paving runways, aprons at Drew Field, from Eberbach Constr. Co., Stovall Office Bldg., **$663,700.**

†**Kan., Fort Riley**—GASOLINE FUELING SYSTEM—U. S. Eng., 601 Davidson Bldg., Kansas City, Mo., June 17, gasoline fueling sys., Marshall Field, from Aqua System, Inc., 385 Gerard Ave., New York, N. Y. **$37,146.** Est. $29,552.



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†Md., Frederick — GASOLINE FUELING SYSTEM—U. S. Eng., 1 and Douglas Sts. N.W., Wash., D. C., gasoline fueling sys., Frederick Airport, from Aqua Systems, Inc., 385 Gerard St., New York, N. Y. **$28,641.**

†Mass., Ayer—FUELING SYSTEM—Con. Q.M., Fort Devens, June 20, fueling sys., from Aqua Systems, Inc., 385 Gerard Ave., New York, N. Y. **$31,026.** CD 6/17.

†Mo., Jefferson Barracks (St. Louis)—SUBSTATION—U. S. Eng., 816 U. S. Courthouse and Customhouse, St. Louis, June 21, 33,000-4,500 volt substation, from National Electric Serv. Co., 1018 N. 6 St., St. Louis. **$38,847.** CD 6/17.

★ **Nev., Las Vegas** — APRON, etc. — U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., June 26, apron and taxiway, military airport, from Gibbons & Reed, 259 W. 3 St. S., Salt Lake City, Utah. **$521,110.** CD 6/19.

†Nev., Las Vegas—GASOLINE FUELING SYSTEM—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., June 25, A.C. gasoline fueling sys., Inv. 264, from Flotation Systems, Inc., 4031 Goodwin Ave., Los Angeles, Calif. **$92,345.** CD 6/19.

N. H., West Lebanon—AIRPORT—U. S. Eng., 819 Industrial Trust Bldg., Providence, R. I., June 23, airport work, paving runways, taxiways and parking areas, Inv. 699-41-295, from O. S. Winslow, 6 Stark St., Nashua, **$104,240.** CD 6/17—ENR 6/19.

†N. Y., Brooklyn—DRYDOCK PUMPING PLANT—Yards & Docks, Navy Dpt., Wash., D. C., June 18, dry dock pump. equip., changes, Navy Yard, from Lane Eng. Co., 32 Colony St., Meriden, Conn., **$292,106.** CD 6/23, under LB.

S. C., Florence—RUNWAY—U. S. Eng., Customhouse, Charleston, June 16, 3 runway extens., taxi strip, paving 3 runways and taxi strip, from W. L. Cobb Constr. Co., Decatur, Ga. **$218,935.** CAA. CD 5/11.

S. C., Lexington—APRONS—Civil Aeronautics Auth., Commerce Bldg., Wash., D. C., grading, paving aprons, from C. G. Fuller, Barnwell, **$95,869.** CD 6/12.

S. C., Lexington—HANGAR—Civil Aeronautics Auth., Commerce Bldg., Wash., D. C., hangar and boiler house, from M. B. Kahn Constr. Co., Columbia, **$110,550.**

S. C., Lexington—FUELING SYSTEM—U. S. Eng., Charleston, June 23, fueling sys. for Lexington Co. Airport, from Aqua Systems, Inc., 385 Gerard St., New York N. Y. **$31,867.** CD 6/12—ENR 6/19.

Tenn., Jackson—AIRPORT—K. Hunt, State Procurement Officer, Stahlman Bldg., Nashville, June 20, paving 102,840 sq. yd. runways and strips, from Bowyer & Johnson, Jackson, at **$1.39** per sq. yd., total **$142,948.** CD 6/18.

★ **Texas** — TRANSMISSION LINES—Brazos River Transmission Co-operative, c/o E. D. H. Farrow, pres., Itasca, June 23, approx. 320 mi. rural electric transmission lines, various counties, from Taylor Constr. Co., Taylor, **$567,376.** CD 6/19.

†Utah, Salt Lake City—AIRPORT IMPROVEMENTS—U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif., June 25, temporary buildings, municipal airport, from Bowers Building & Constr. Co. 1033 S. State St., **$168,478.** CD 6/23.

★ **†Washington** — SUBSTATION — Bonneville Project, P. O. Box 3537, Portland, Ore., June 20, oil circuit breakers for substations, Ampere, North Bonneville and Vernita, Inv. 1934, from General Electric Co., 1 River Rd., Schenectady, N. Y. **$1,108,190.** CD 5/21—ENR 5/29.

†Wash., Spokane—FUELING SYSTEM—U. S. Eng., 700 Central Bldg., Seattle, June 23, A. C. gasoline fueling sys. 16 tanks, at Sunset Field, Inv. 347, from Aqua Systems, Inc., 385 Gerard Ave., New York, N. Y. **$138,051.**

†Alaska, Naknek — AIRPORT — Civil Aeronautics Auth., Commerce Bldg., Wash., D. C., June 25, airport, from Morrison-Knudsen Constr. Co., 319 Bway, Boise, Idaho, **$590,425.** CD 6/16—ENR 6/19.

CONTRACTS AWARDED

Ark., Hope—AIRPORT—A. Graves, mayor, municipal airport. **WPA. $87,647.** CD 1/7—ENR 1/9.

Ariz., Phoenix—LANDING AREAS—Grading, leveling landing areas, drainage ditches, pipe lines, paving runways, taxi strips, aprons, traffic lanes, electrical facilities, Luke Field, **WPA. $310,752.**

†Calif., Camp San Luis Obispo—RIFLE RANGE—Con. Q. M., rifle range, to Trewhitt-Shields and Fisher, Pacific Southwest Bldg., Fresno, **$49,300.** Bids 6/20. CD 6/10—ENR 6/12.

Calif., Fresno—AIRPORT—U. S. Eng., Sacramento, landing strips, runways, taxiways, appurtenant facilities Fresno Air Base, Inv. 11-5-41-263, to N. M. Ball Sons, 852 Carmel St., Berkeley, **$290,097.** Bids 6/13. CD 6/19—ENR 6/26 under LB.

†Calif., Hamilton Field—RUNWAY PAVING—U. S. Eng., 401 Customhouse San Francisco, runway paving, Inv. 868-41-230 Govt. forces. Former bids rejected. CD 6/25—ENR 7/3, under LB.

Del., Wilmington — LAUNCHING WAYS, etc.—Pusey & Jones Corp., Front and Poplar Sts., Wilmington, 5 launching ways and dock to Merritt Chapman & Scott Corp., 17 Battery Pl., New York, N. Y. Est. **$400,000.**

†Fla., Tampa—GASOLINE FUELING SYSTEM, etc.—U. S. Eng., P. O. Box 4970, Jacksonville, gasoline fuel storage and distr. sys., McDill Field, to Aqua Systems, Inc., 385 Gerard Ave., New York, N. Y. **$99,307.** Awarded 6/21.

†Fla., Valpariso — GASOLINE FUELING SYSTEM—U. S. Eng., Mobile, Ala., gasoline fueling sys., Eglin Field, to Aqua Systems, Inc., 385 Gerard Ave., New York, N. Y. **$79,253.** Awarded 6/21. CD 5/2—ENR 5/8.

†Ill., Savanna—RAILROAD TRACKS—Con. Q.M., gage railroad tracks, Savanna ordnance depot, to Decker & McDowell, 53 W. Jackson St., Chicago. **$62,300.**

†Miss., Meridian — AIRPORT IMPROVEMENT—U. S. Eng., P. O. Box 60, Vicksburg, clearing, grubbing, excavating, draining, levee, seeding, sodding, surfacing, Key Field, **WPA. $395,274.**

†Mo., Dutchtown—AIRPORT—U. S. Eng., 1 and Douglas Sts. N.W., Wash., D. C., airport for advanced training of pilots. **WPA. $194,370.**

†N. J., Raritan and **Woodbridge** — ELECTRIC DISTRIBUTION SYSTEM—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., removing old underground and overhead electric distr. sys., Raritan Arsenal, to J. J. Tomasullo Electric Co., 531 Westfield Ave., Roselle. **$59,975.** Bids 6/3. CD 6/2.

Okla., Mohawk—CABLE—South Western Bell Telephone Co., 405 N. Bway., Oklahoma City, cable from Tulsa to new aircraft bomber plant, near here, own forces. **$30,000.**

Pa., Johnstown—AIRPORT—J. M. Cramer, city clk., City Hall, grading, airport near here, to Frank Mashuda Co., 5556 W. Roosevelt Dr., Milwaukee, Wis., **$275,166.** CAA. H. Lee Wilson, City Hall, city engr.

Pa., Milton — AIRPORT — Milton Flying Club, D. S. Cawley, secy., Milton, airport, grading runways, hangar, etc. on 100 acre site, south of here, day labor and separate contracts. **$25,000.** A. Stamm, Turbotville, engr. CD 57—ENR 5/15.

S. C., Lexington—AIRPORT TENT CITY, etc.—U. S. Eng., Charleston, tent city, sewerage, Lexington Co. airport, to C. Y. Thomason, Greenwood. **$98,688.** Awarded 6/23.

†Tex., Wichita Falls—SPUR TRACKS—U. S. Eng., Citizens Bank Bldg., Denison, 5½ mi. service lines, spur tracks, in connection with A.C. Training School, to Missouri, Kansas & Texas R.R., Katy Bldg., Dallas. **$67,840.** Awarded 6/25.

†Utah, Ogden—POWER LINE—Con. Q.M., Hill Field, relocation power line, Hill Field to Utah Power & Light Co., Ogden. **$32,950.**

†Alaska, Big Delta—AIRPORT, etc.—Civil Aeronautics Auth., Commerce Bldg., Wash., D. C., airport and radio station, to C. F. Lytle, 505 Nebraska St., Sioux City, Ia., and Green Constr. Co., 506 Insurance Exch. Bldg., Des Moines, Ia., **$420,576.** CD 6/10—ENR 6/12.

★ **Newfoundland, Batwood** — AIRPORT BUILDINGS—Dpt. National Defense for Air, Ottawa, Ont., frame buildings. R.C.A.F. Station, to Atlas Constr. Co. Ltd., 679 Belmont St., Montreal, Que. About **$1,000,000.**

N. S., Truro—OPERATIONAL TRAINING UNIT—Dpt. National Defense for Air, Ottawa, Ont., additional wood construction buildings, No. 1 Operational Training Unit in Debert, to Tomlinson Constr. Co. Ltd., 21 King St. E., Toronto, Ont., **$84,000.**

N. S., Halifax—MOORING PIERS—Secretary, c/o National Harbours Bd., Ottawa, Ont., mooring piers for shipyards, to J. P. Porter & Sons, Ltd., 1010 St. Catherine St. W., Montreal, Que. **$93,000.** Bids 6/12. CD 6/5.

Ont., Cornwall—STREET RAILWAY—Cornwall Street Railway Co., Cornwall, G. Smith, supt. Constr. Dpt., street railway track exten., day labor. **$40,000.**

LATIN AMERICA

Mexico, Mexico City—Universidad Nacional, Mexico, D. F., plans various educational and recreational buildings. **$115,000.**

PUBLIC BUILDINGS

PROPOSED WORK

†Ala., Montgomery — Con. Q.M., Maxwell Field, oilhouse and motor repair shop. About $46,100.

†Calif., Fort Baker—Con. Q.M., Fort Mason, San Francisco, completed plans hospital buildings, Inv. W-6616-41-188.

†Calif., Hamilton Field—Con. Q.M., oilhouse and motor repair shop. About $46,100.

PUBLIC BLDGS. (Proposed Work, Cont'd.)

†**Calif., March Field**—Con. Q.M., oilhouse and motor repair shop. About $46,100.

†**Calif., Moffett Field**—Con. Q.M., oilhouse and motor repair shop. About $46,100.

†**Calif., Monterey**—Con. Q.M., Fort Ord, rejected bids June 19, 12 barracks, Presidio of Monterey. Inv. Q.M. 6645-41-44.

†**Calif., San Francisco**—U. S. Eng., 401 customhouse, completed plans replacement structural steel roof of Submarine Mine storehouse, Yerba Buena Island, San Francisco Bay, Inv. 868-41-238.

†**Calif., Santa Ana**—Pub. Bldgs. Administration, Wash., D. C., received no bids June 18, F.C.C. Radio Monitoring Station. CD 6/3—ENR 6/5.

★†**Colo., Denver**—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., 2 facilities for 3,300 additional officers, cadets and enlisted men, Lowry Field, $1,410,905.

†**Colo., Denver**—Con. Q.M., Lowry Field, oilhouse and motor repair shop. About $46,100.

†**Conn., Bantam**—Federal Works Agency, Wash., D. C., 40 housing units, $120,000. D. C. Sanford, Jr., Eden St., Stamford, archt. CD 6/18—ENR 6/26.

†**Conn., Bridgeport**—Federal Works Agency, Wash., D. C., 150 unit defense housing, Park Ave. and Benson St. $450,000. Charles Wellington Walker, 1115 Main St., archt.

Conn., Farmington—Town, Bd. Selectmen, Town Hall, plans by C. J. Malmfeldt, 36 Pearl St., Hartford, and soon takes bids 2 story, bsmnt., brick, steel school addn., School St. $150,000. CD 4/25—ENR 5/1.

•★**Conn., Middletown**—W. Citron, chn. City Housing Auth., 252 Main St., revised plans by S. J. Passanesi, 363 Main St., for site, thirty-six 2 story, brick row houses, Silver St. $860,000. USHA. W. J. Carson, 363 Main St., mechanical engr. L. Norman Germain, 116 College St., civil engr. CD 1/16—ENR 1/23.

†**D. C., Bolling Field**—Con. Q.M., oilhouse and motor repair shop. About $46,100.

†**Fla., Orlando**—Con. Q.M., oilhouse and motor repair shop, Orlando Air Base. About $46,100.

†**Fla., Tallahassee**—Con. Q.M., oilhouse and motor repair shop. About $46,100.

†**Fla., Tampa** — Con. Q.M., MacDill Field, oilhouse and motor repair shop. About $46,100.

†**Ga., Savannah**—Con. Q.M., oilhouse and motor repair shop. About $46,100.

Idaho, Twin Falls—Twin Falls Co., Courthouse, bond election soon, hospital addn. $150,000.

†**Ill., Chanute Field (Belleville)**—Con. Q.M., oilhouse and motor repair shop. About $46,100.

†**Ill., Chanute Field (Rantoul)**—Con. Q.M., recreational building, $70,000.

★†**Ill., Harvey**—Defense Plant Corp., Wash., D. C., plant. $2,046,845. Wyman-Gordon Co., 105 Madison St., Worcester, Mass., will operate.

★†**Ill., Scott Field (Belleville)**—U. S. Eng., 816 U. S. Courthouse and Customhouse, St. Louis, Mo., bids soon barracks, supply rooms, day rooms, administration buildings, mess halls, warehouses, recreation buildings, fire stations, post exchanges, service club, theatre, commissary, guard house. $2,629,804.

†**Ill., Scott Field (Belleville)**—Con. Q.M., oilhouse and motor repair shop. About $46,100.

★†**Ia., Burlington**—Farm Security Administration, Dpt. Agriculture, Wash., D. C., 1,000 portable houses. $500,000.

★†**Kan., Fort Leavenworth**—Con. Q.M., reception center. $509,460.

Kan., Hays—H. V. Erickson, city mgr., municipal building, $175,000. Mann & Co., Wiley Bldg., Hutchinson, archt. CD 5/27.

★†**La., Baton Rouge**—Defense Plant Corp., Wash., D. C., synthetic rubber plant. $10,000,000. Standard Oil of Louisiana, North Baton Rouge, will operate. CD 6/10—ENR 6/12.

†**La., Shreveport**—Con. Q.M., Barksdale Field, oilhouse and motor repair shop. About $46,100.

†**Maryland**—Navy Dpt., 18 St. and Constitution Ave. N.W., Wash., D. C., terraces, walls, steps and platforms, Medical centre.

†**Md., Aberdeen**—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., storage and assembly building, Proving Ground. $425,000.

†**Mass., Chicopee Falls**—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., barracks, supply rooms, administration building, day rooms, mess halls, utilities and engineering, for 803rd Engineers, Westover Field, $261,931.

†**Mass., Chicopee Falls**—Con. Q.M., Chicopee Falls, oilhouse and motor repair shop. About $46,100.

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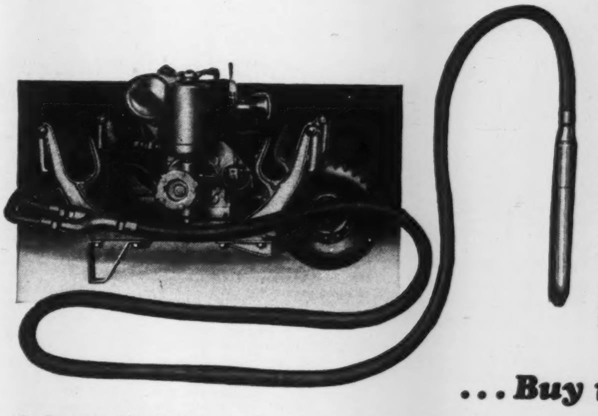

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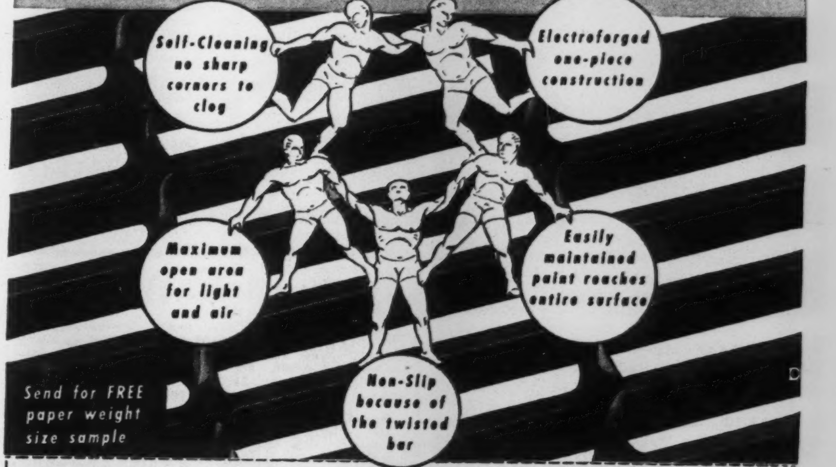
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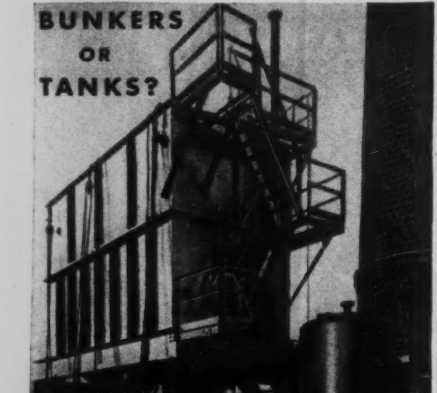

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PUBLIC BLDGS. (Proposed Work, Cont'd.)

★**†Mich., Detroit** — Defense Plant Corp., Wash., D. C., constructing, equipping plant. $5,800,000. Kelsey-Hayes Wheel Co., 3600 Militry St., Detroit, will operate.

†Mich., Mount Clemens—Con. Q.M., Selfridge Field, oilhouse and motor repair shop. About $46,100.

Minn., Caledonia—Bd. Educ., E. J. Crotty, clk., plans by E. B. Croft, 1004 Marquette Ave., Minneapolis, 2 story, bsmnt., rein.-con., brick, tile school. $150,000. Bond election contemplated.

Mo., Kansas City—Plans by Keene & Simpson, Land Bank Bldg., wholesale public market building, 2 blocks long. Over $200,000. A. C. Everham, City Hall, dir. P. Wks.

★**†Mo., Robertson** — McDonnell Aircraft Corp., Lambert-St. Louis Municipal Airport, Bridgeton, Mo., bids soon plant for manufacture tail surfaces and other airplane parts for War Dpt., under lease agreement with RFC, War and Navy Dpts. $512,717. Palmer and Lamdin, 1021 St. Paul St., Baltimore, Md., archts.

★**†Mo., St. Louis Co. (St. Louis P. O.)**—Emerson Electric Mfg. Co., W. S. Symington, pres., 1824 Washington Ave., construction, completion, operation and maintenance airplane gun turret plant, near 8100 Florissant Rd., St. Louis Co. $10,000,000. War Dpt. has issued letter of intent.

Mo., Webster Groves (St. Louis P. O.)—Webster Groves Bd. Educ., W. E. Goslin, supt., 42 Selma Ave., plans by Wm. B. Ittner, Inc., 408 Bd. Educ. Bldg., 911 Locust St., St. Louis, 2 story, bsmnt., 68x150 ft., brick, rein.-con. school for colored.

★**N. J., Fairlawn** — Bd. Educ., 2 story, bsmnt., brick, steel Junior and Senior High School, Berdman Ave. $530,000. Fanning & Shaw, 49 Ward St., Paterson, archts.

†N. J., Fort Monmouth—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., two 1 story frame laboratory buildings. $216,400.

†N. M., Albuquerque—Con. Q.M., oilhouse and motor repair shop. About $46,100.

★**N. Y., Brooklyn**—Dpt. Markets, Municipal Bldg., New York, plans by A. H. Johnson, c/o owner, 7 one story, mezzanine merchant stores and offices, 241x110 ft. and 55x241 ft., also 2 story, 55x241 ft. merchant store and administration building, 8301-17 Foster Ave. $1,057,500. CD 5/2—ENR 5/8.

★**N. Y., Brooklyn**—New York City Housing Auth., G. Swope, chn., 122 E. 42 St., New York, Brownsville Houses, low rent housing. $10,000,000.

★**†N. Y., Buffalo**—Buffalo Arms Corp., Buffalo, additional building, machinery and equip. for manufacture aircraft machine guns, for War Dpt. $10,870,000. Defense Plant Corp. will finance.

†N. Y., Mitchel Field—Con. Q.M., oilhouse and motor repair shop. About $46,100.

N. Y., New York—Bd. Transportation, 250 Hudson St., altering E. 74 St. power plant to permit East River Dr. Imprvt.

★**N. Y., New York**—New York City Housing Auth., G. Swope, chn., 122 E. 42 St., Lillian Wald Houses, low rent housing, lower east side. $12,600,000.

★**O., Apple Creek**—State Dpt. Welfare, C. L. Sherwood, dir. State Office Bldg., Columbus, plans by R. B. Schildknecht, state archt., Columbus, 3 new buildings, Apple Creek Institution for Feeble Minded. $763,000.

O., Athens—State Dpt. Welfare, State Office Bldg., C. L. Sherwood, dir., plans by R. B. Schildknecht, state archt., Columbus, wing for male patients, Athens state hospital. $230,000.

O., Athens—Ohio University, plans by R. B. Schildknecht, state archt., Columbus, new buildings or building. $320.800.

O., Berea—R. E. Kobie, dir. Pub. Serv., municipal light plant imprvs. W. C. Kammerer & Assoc., 1900 Euclid Ave., engr. CD 6/13—ENR 6/19.

★**O., Columbus**—Ohio State University, C. E. Steeb, sec. Bd. Trustees, Columbus, main library addn. $300,000, agriculture laboratory $350,000, recitation building $350,000, etc. Total est. $1,216,000. H. D. Smith, Brown Hall, University archt.

O., Columbus—State Dpt. Welfare, State Office Bldg., C. L. Sherwood, dir., Columbus, plans by R. B. Schildknecht, state archt, hospital bldgs., Columbus State Hospital. $275,000.

O., Gallipolis—State Dpt. Welfare, C. L. Sherwood, dir., State Office Bldg., Columbus, plans by R. B. Schildknecht, state archt, Columbus, repairs, imprvs., Gallipolis Epileptic Hospital, $171,200.

O., Granville—Village School Dist., L. Black, supt., school. $180,000. Bonds approved

O., Kent—Kent State University, Kent, plans by R. B. Schildknecht, state archt., Columbus, new building or buildings. $232,300.

★**†O., Lacarne**—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., storehouse at Erie Proving Ground. $2,275,000.

O., Macedonia—State Dpt. Welfare, State Office Bldg., C. L. Sherwood, dir., Columbus, plans by R. B. Schildknecht, state archt., Columbus, 3 new wards, Hawthornden State Hospital. $325,000.

O., Oxford—Miami University, Oxford, plans by R. B. Schildknecht, state archt., Columbus, new building or buildings. $298,700. CDL 1/14—ENR 1/23.

★**†Okla., Fort Sill**—Con. Q.M., Regional Depot. $1,599,300.

†Okla., Oklahoma City—Con. Q.M., oilhouse and motor repair shop. About $46,100.

Pa., Allentown—Comrs. Lehigh Co., Court house, administration and office building, Hamilton St. $150,000.

†Pa., Erie—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., warehouse and storage facilities, Army Proving Grounds. $425,000.

†Pa., Latrobe—Defense Plant Corp., Wash., D. C., constructing, equipping, radio parts manufacturing plant. $320,699. Stupakoff Ceramic and Mfg. Co., Latrobe, will operate.

★**†Pa., Pennypack Park**—Federal Works Agency, Wash., D. C., 1000 residences, defense housing. $3,500,000.

★**†Pa., Phila.**—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., expansion optical shop, Frankford Arsenal. $1,020,000.

★**Tenn., Jackson**—Jackson Housing Auth., c/o A. B. Foust, mayor, City Hall, plans by J. Frazer Smith, Goodwyn Institute Bldg., Memphis, multiple low-rental housing. $600,000. CD 4/25—ENR 5/1.

Tenn., Milan—City, c/o Harwood & Woolwine, archts., 1102 American Trust Bldg., Nashville, school.

Tex., Austin—Bd. Control, H. Knox, chn., capitol building repairs, $187,136.

Tex., Austin—State, Austin, cotton laboratory plant, $250,000.

Tex., Bay City—R. Gusman, chn. City Building Com., plans by Hedrick & Lindsley, c/o Southern Standard Bldg., Houston, 1 story, 166x251 ft., brick, hollow tile recreation center, auditorium and gymnasium, bowling alleys, concrete fdn. $150,000. CD 4/7—ENR 4/17.

★**Tex., Brownwood** — Independent School Dist., c/o E. J. Woodward, supt., plans by Voelcker & Dixon, 913½ Indiana Ave., Wichita Falls, junior school, $250,000; and public school, $300.000. CD 3/7—ENR 3/13.

†Tex., Houston—Con. Q.M., Ellington Field, oilhouse and motor repair shop, About $46,100.

Tex., Lufkin—Angelina Co., c/o County Judge Lufkin, plans by Kent & Coston, Lufkin, 2 to 3 story, part bsmnt., brick, rein.-con., hospital plant. $210,000. CD 6/19—ENR 6/26.

†Tex., San Angelo—Con. Q.M., oilhouse and motor repair shop. About $46,100.

†Tex., San Antonio—Con. Q.M., Brooks Field, oilhouse and motor repair shop. About $46,100.

†Tex., San Antonio—Con. Q.M., Kelly Field, oilhouse and motor repair shop. About $46,100.

★**†Tex., Wichita Falls**—U. S. Eng., Citizens Bank Bldg., Denison, replacement training center Aviation Mechanics Training School. Sheppard Field. $3,824,550.

†Va., Langley Field—Con. Q.M., oilhouse and motor repair shop. About $46,100.

★**Va., Richmond**—Richmond Housing Auth., plans by Baskervill & Son, Central Natl. Bank Bldg., 200 dwelling units for whites, $900,000; plans by M. E. Wright & Son, 1103 E. Main St., and M. C. Lee, 110 N. 7 St., 150 dwelling units for negroes, $750,000. CD 2/7—ENR 2/13.

†Wash., Fort Lewis—Con. Q.M., post exchange, $30,000.

★**†Wash., Fort Lewis**—War Dpt., 20 St and Constitution Ave. N.W., Wash., D. C., motor transport repair depot. $1,567,800.

†Wash., McChord Field—Con. Q.M., oilhouse and motor repair shop. About $46,100.

★**†Wash., Port Lawton**—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., overseas discharge and replacement depot, etc. $926,350.

★**†Wash., Seattle**—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., barracks, administration and recreation buildings, storeroom, day rooms, cafeteria and officers quarters and mess, Fort Lawton, $926,350.

†Wash., Spokane—Con. Q.M., oilhouse and motor repair shop. About $46,100.

†Wash., Spokane—War Dpt., 20 St and Constitution Ave. N.W., Wash., D. C., enlarging hospital, Fort George Wright.

†Alaska—Dpt. Interior, Wash., D. C., Indian hospital, $250,000.

N. S., New Glasgow—Wartime Housing Ltd., 55 York St., Toronto, Ont., rescinded contract 240 family dwellings. About $350,000. CD 5/23—ENR 5/29, under CA.

PUBLIC BLDGS. (Continued)

BIDS ASKED

Bids Asked July 7

★†**Pa., Stowe Twp.**—Federal Works Agency, Wash., D. C., defense housing, 250 families. Pa. 36, 171, $650,000. C. S. Stein, 56 W. 45 St., New York, N. Y., archt. Eddie Freund & Campbell, 110 W. 40 St., New York, N. Y., engrs. CD 5/28—ENR 6/5.

Bids Asked July 10

†**Conn., Meriden**—Pub. Bldgs. Administration, Wash., D. C., brick, stone, post office addn. and remodeling, Colony St. $125,000.

N. J., Jersey City — Jersey City Housing Auth., City Hall, Booker T. Washington Housing, Freemont Ave., Bright and Colden Sts. $1,344,000. USHA. C. H. Ziegler, 26 Journal Square, Jersey City, archt., H. A. Kelly, 921 Bergen Ave., Jersey City, engr. CD 5/21—ENR 5/29.

★†**Pa., Dravosburg**—Federal Works Agency, Wash., D. C., 250 families, defense housing, 41 two story buildings. $1,150,000. W. M. Braziell, 304 Fourth Ave., Pittsburgh, archt. CD 5/28—ENR 6/5.

Bids Asked July 14

Minn., Willmar—E. H. Brogren, city clk., imprv. municipal light and power plant, incl. electric switching and control equip., deaerating feed water heater, etc. Over $25,000 (not official). Williams & Burlingame, Stillwater, engrs. CD 5/14—ENR 5/22.

Bids Asked July 15

†**Calif., San Diego**—Eleventh Naval Dist., foot of Bway., San Diego, exten. storehouse, Naval Operating Base (Supply Depot). Over $150,000.

O., Toledo — Toledo Metropolitan Housing Auth., A. G. Spieker, chn., 392 Nebraska Ave., Ravine Park Village housing, 53 buildings, 212 units, Seaman, Arch, Digby, Elwood and Popular Sts. Mills, Rhines, Bellman & Nordhoff, Inc., 518 Jefferson Ave., archts. and engrs.

Bids Asked July 16

†**Md., Baltimore**—Con. Q. M., Fort McHenry, motor transport school, and auditorium, experimental laboratory, Holabird Q. M. Depot; adv. ENR 7/3.

Bids Asked

O., Ravena — Warren Co. Housing Auth., 1,300 housing units for defense workers.

†**Tex., Mineral Wells**—War Dpt., 20 St and Constitution Ave. N.W., Wash., D. C., 11 fireproof magazine buildings for Infantry ammunition storage, $400,000.

†**Tex., San Antonio** — U. S. Eng., Federal Bldg., Galveston, cadet barracks, mess halls, officers quarters, storage unit, ground development, for Air Corps Observation Squadrons. $157,190.

★†**Virginia**—U. S. Eng., 1 and Douglas Sts. N.W., Wash., D. C., quartermaster depot, 73 acre site, south of Arlington Experimental Farm. $3,000,000.

LOW BIDDERS

Ala., Gadsden—Greater Housing Auth., June 24, 100 one story, housing units for defense workers, from Rust Eng. Co., Martin Bldg., Birmingham, **$290,000.** Est. $325,000. CD 5/26—ENR 5/29.

†**Calif., Fort Ord**—Con. Q. M., June 24, 2 motor repair shops, oil houses, grease racks, engine depot co. bldg., dental clinic, from Ford J. Twaits Co. and Morrison-Knudsen Co., Inc., 816 W. 5 St., Los Angeles. **$144,430.**

Calif., San Jose—Directors San Jose Unified School Dist., June 24, general contract 2 story, bsmnt., rein.-con. school (1st unit Abraham Lincoln High School), from M. R. Peterson, 1116 "O" St., Sacramento. **$204,469.** CD 5/28—ENR 6/5.

Conn., East Lyme—State, U. S. Property & Disbursing Officer, State Armory, Hartford, June 21, 2 brick, steel garages, State Military Reservation, from John D. McWilliams & Co., 16 Water St., Norwich, **$43,126.**

Del., Wilmington—State Hy. Dpt., W. W. Mack, ch. engr., Dover, repair shop, Contr. 796, from C. H. Schwertner, 1505 Race St., Phila., Pa. **$110,000.**

†**Fla., Tampa**—U. S. Eng., P. O. Box 1407 Tampa, June 20, armament instrument and inspection adjustment building, McDill Field, from E. S. Moore & Sons, St. Petersburg, **$124,700.** CD 6/16.

†**Ga., Augusta** — Con. Q.M., 101 Marietta Bldg., Atlanta, June 19, shop and heating plant, Augusta Arsenal, from Wheatley & Mobley, Augusta. **$83,465.** CD 6/10—ENR 6/12.

†**Ga., Columbus**—Con. Q. M., Fort Benning, shop repair building, from Williams Lumber Co., 1038 13 St. **$395,000.**

†**Ga., Macon**—Con. Q. M., Camp Wheeler, June 17, 31 miscellaneous buildings, from Knox Bros. Lumber Co., Thomson. **$402,109.** CD 6/10—ENR 6/12.

★†**Ill., Scott Field (Belleville P. O.)**—U. S. Eng., 816 U. S. Courthouse and Custom House, St. Louis, Mo., June 24, 6 radio schools, from O'Driscoll & Grove, Inc., Statler Hotel,

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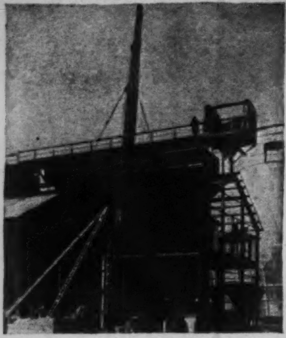

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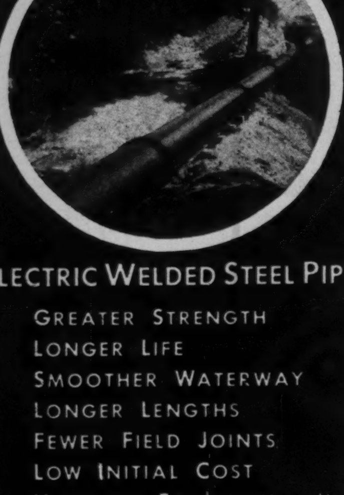

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PUBLIC BLDGS. (Low Bidders, Con't.)

St. Louis, Mo., and 247 Park Ave., New York, N. Y. **$990,000.** CD 6/17—ENR 6/19.

★**†Ill., Savanna**—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., June 24, 14 warehouses and 3 small buildings, Savanna Ordnance Depot, from Manhattan Constr. Co., Muskogee, Okla. **$958,300.** CD 6/18.

†Kan., Fort Leavenworth—Con. Q.M., June 20, reception center addn., from G. E. Stalker, Basehor, **$322,492.** CD 6/3—ENR 6/5.

★**†La., Alexandria**—Con. Q.M., Camp Claiborne, June 24, 176 recreational buildings, from Robert Angelle, Breaux Bridge, **$512,000;** 12 chapels, 12 recreational buildings, from J. A. Harper, Crowville, **$438,107.** CD 6/17—ENR 6/19.

†Md., Aberdeen—Con. Q.M., Aberdeen Proving Grounds, June 23, 4 chapels, recreation, hospital, post barracks, administration building, from J. K. Ruff Co., 100 W. 22 St., Baltimore. Est. **$223,000.** CD 6/19.

†Md., Beltsville—Dpt. Agriculture, Mall between 12 and 14 Sts., Wash., D. C., June 24, engineers laboratory, from D. Hedin Constr. Co., 820 Michigan Ave. N.E., Wash., D. C. **$45,000.** CD 6/3—ENR 6/5.

†Md., Fort George G. Meade — Con. Q.M., June 20, barracks, reception center, administration and induction buildings, etc., from Joseph Light Constr. Co., 1436 Kennedy St. N.W., Wash., D C. **$374.987.** CD 6/10—ENR 6/12.

★**Md., Fort George G. Meade** — Con. Q.M., June 24, warehouse, mess room, from Tuller Constr. Co., 95 Monmouth St., Red Bank, N. J., **$448,240;** hospital, theatre, etc., from Davis Constr. Co., 9 West Chase St., Baltimore, **$213,750.** CD 6/19.

★**†Md., Suitland**—Pub. Bldgs. Administration, Wash., D. C., June 17, Federal office bldg. 3, from John Kennedy & Co., Inc., 41 E. 42 St., New York, N. Y. **$2,980,000.** CD 5/29—ENR 6/5.

†Mass., Ayer — Con. Q.M., Fort Devens, June 24, chapels, from Federal Contg. Co., Inc., 294 Washington St., Boston, $164,973. CD 6/20.

†Mass., Ayer—Con. Q. M., Fort Devens, June 23, motor repair shops, grease and inspection racks, wash racks and oil houses, and 2 motor repair stations, 2 gas stations, 2 stables, officers quarters, ponton shed, from John Bowen Co., 129 Newbury St., Boston, **$178,000** and **$160,500** respectively. CD 6/20.

†Mass., Falmouth—Con. Q. M., Camp Edwards, June 25, 12 regimental chapels, from Chandler Constr. Co., Inc., 45 Newbury St., Boston. **$254,380.** CD 6/23.

★**†Mass., Watertown** — Commanding Officer, Watertown Arsenal, 2½ story, 236x436 ft., rein.-con., brick warehouse, from E. J. Rappoli Co., Inc., 515 Massachusetts Ave., Cambridge, **$797,000.** CD 5/26—ENR 5/29.

★**†N. J., Dover**—Con. Q.M. Picatinny Arsenal, June 20, headquarters and administration building, from Frank Briscoe Co., Inc., 287 S. 19 St., Newark. **$753,940.** CD 6/12.

N. Y., Deer Park—Comr. Mental Hygiene State Office Bldg., Albany, June 25, Married Employees Building 40, at New State Hospital, near here, from Amsterdam Bldg. Co., 480 Lexington Ave., New York, Proposal 2, **$286,500.** CD 6/17—ENR 6/19.

★**†N. Y., Niagara Falls**—Pub. Bldgs. Administration, Wash., D. C., June 23, 300 housing units, from Siegfried Constr. Co., 6 N. Pearl St., Buffalo, **$1,220,470.** CD 4/25—ENR 5/1.

†N. C., Wilmington—Con. Q.M., Camp Davis, June 16, 8 chapels, from F. N. Thompson, 145 Brevard Court, Charlotte, **$197,000.** CD 6/3—ENR 6/5.

★**†S. C., Charleston**—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., overseas, discharge, replacement depot near here, from M. B. Kahn Constr. Co., Columbia. **$552,700.** Lafaye, Lafaye and Fair, 1226 Sumter St. Columbia, archts.

★**†Tenn., Nashville** — Nashville Housing Auth., June 20, housing, 300 residences for USHA, from Central Contg. Co., 1st Natl. Bank Bldg., Atlanta, Ga. **$948,000.**

★**†Tex., Houston**—U. S. Eng., Federal Bldg., Galveston, housing facilities, barracks, mess halls, warehouses, day rooms, supply buildings, etc., from Tellepsen Constr. Co., 3900 Clay St., **$688,194;** A.C. hangar, from Claude Everett, Inc., 522 Barziza St., **$73,077.** CD 6/17.

†Tex., Laredo—Pub. Bldgs. Administration, Wash., D. C., June 18, border station, from Lundberg Richter Co., Inc., Rome, Ga., **$230,700.** CD 5/13—ENR 5/15.

†Tex., San Antonio — Con. Q.M., Fort Sam Houston, June 24, barracks, mess halls, recreation bldgs., utilities, warehouses, etc., from A. P. Rheiner & Co., Builders Exch., **$218,169.** CD 6/20.

★**†Wash., Bremerton** — Puget Sound Navy Yard, June 26, 7 story, bsmnt., 150x451 ft. storehouse, from H. S. Wright & Co., 407 Yale Ave. N., Seattle, and L. H. Hoffman, 715 S.W. Columbia St., Portland, Ore., **$2,194,550;** pier, from Sound Constr. Co., Northern Life Tower, Seattle, Peter Kiewit & Sons, Inc., 1024 Omaha Natl. Bank Bldg., Omaha, Neb., **$1,947,700.** CD 6/13—ENR 6/19.

†Wash., Fort Lewis—Con. Q.M., June 23, temporary housing, 31 buildings, water and sewer facilities, electric distr. sys., Inv. 6105-41-110, from J. W. Bailey, 228 Ninth Ave N., Seattle, **$233,000.** CD 6/10—ENR 6/12.

CONTRACTS AWARDED

†Ark., Little Rock—Con. Q.M., Camp Joseph T. Robinson, 11 chapels, recreation and administration buildings, etc., to J. J. Fritch, Construction Bldg., Dallas, **$219,244.** Bids 6/11, awarded 6/24. CD 6/4.

★**†Calif., Fort Ord**—Con. Q. M., barracks, mess hall, administration and storeroom buildings, to Ford J. Twaits Co., & Morrison-Knudsen Co., 816 W. 5 St., Los Angeles, **$941,812.** CD 6/11—ENR 6/19.

†Calif., Hamilton Field—U. S. Eng., 401 Customhouse, San Francisco, warehouse facilities, Govt. forces.

†Calif., Mare Island—Yards & Docks, Navy Dpt., Wash., D. C., hospital building H-81 addn., to Barrett & Hilp, 918 Harrison St., San Francisco, **$350,000.** Blanchard & Maher, 369 Pine St., San Francisco, archts.

†Calif., Presidio of Monterey—Con. Q.M., Fort Ord, 100x150 ft. laboratory and 25x48 ft. animal house, to W. C. Smith, Inc., San Carlos Hotel, Monterey, Calif., and 310 Builders Exch. Bldg., Duluth, Minn. **$51,732.** Bids 6/24.

†Calif., Riverside—Con. Q.M., Camp Haan, hospital, 66 day-room and administration buildings, to Pinkerton & Jameson, 118 E. 6 St., Corona. **$188,000.** Bids 6/17. CD 6/11.

★**†Calif., San Diego**—Federal Works Agency, Wash., D. C., housing, 500 units, to Fred J. Early, 369 Pine St., San Francisco, **$1,393,500** ***300 units, to Myers Bros., 3407 San Fernando Rd., Los Angeles, **$836,400*****200 units, to Wesco Constr. Co., 2000 Hyperion Ave., Los Angeles. **$555,400.** Grand total $2,785,300. CD 5/9—ENR 5/15.

★**†Calif., Vallejo** — Federal Works Agency, Wash., D. C., housing 992 units, to Barrett & Hilp, 918 Harrison St., San Francisco, **$2,790,496*****700 units, to Robert McCarthy, 1363 14 Ave., San Francisco, **$2,025,100.** CD 4/25—ENR 5/1.

★**†Fla., Starke**—Con. Q.M., Camp Blanding, barracks, recreation buildings, chapels, officers' quarters, nurses' mess, etc., to Watt & Sinclair of Florida, Inc., 207 Royal Palm Alley, West Palm Beach. **$1,023,774.** Bids 6/3. CD 6/9—ENR 6/12.

†Ind., Fort Benjamin Harrison—Con. Q.M., chapels, theatres, barracks, to Pearson Constr. Co., Benton Harbor, Mich., **$419,050,** awarded 6/19. CD 4/17—ENR 4/24.

★**†Ind., LaPorte** — Federal Works Agency, Wash., D. C., 200 dwellings, to Green Lumber Co., Laurel, Miss., **$575,400.** CD 4/25—ENR 5/1.

★**†La., New Orleans**—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., port of embarkation buildings, facilities, to Stevens Bros. and Miller & Hutchinson, 730 Gravier St. **$1,259,950.** Gardner & Howe, Porter Bldg., Memphis, Tenn., engrs. and archts.

†Md., Edgewood — Con. Q.M., Edgewood Arsenal, five 1 story ordnance buildings, to Cummins Constr. Co., 403 Cathedral St., Baltimore. Est. **$200,000.**

†Mo., Jefferson Barracks (St. Louis P. O.)—U. S. Eng., 816 U. S. Courthouse and Customhouse, St. Louis, 1 story, rein.-con. cold storage building, to Dickie Constr. Co., 317 North 11 St., St. Louis, **$108,860.** CD 5/23—ENR 5/29, under LB.

★**†Mo., Rolla**—Federal Works Agency, Wash., D. C., 500 dwellings, Fort Leonard Wood, to Barrett & Hilp, 918 Harrison St., San Francisco, Calif., **$1,465,500.**

†N. J., Raritan and **Woodbridge**—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., 1 story, brick, steel garage, Raritan Arsenal, to Gumina Constr. Co., 14 Georges Rd., New Brunswick. **$67,445.**

N. J., Trenton—Quartermaster General Dpt., State House, motor vehicle storage and repair shop, **WPA. $81,727.** W. D. Cougle, 1102 S. Broad St., Trenton, WPA and owner's engr.

★**†N. C., Fort Bragg**—Con. Q.M., mobilization buildings, regimental chapels, to V. P. Loftis, Builders Bldg., Charlotte. **$780,000.** CD 6/17—ENR 6/19.

★**†N. C., Wilmington**—Federal Works Agency, Agency, Wash., D. C., 300 housing units, to T. A. Loving & Co., Goldsboro, **$758,473.** Bids 6/11, awarded 6/23. CD 6/17—ENR 6/19.

★**N. C., Wilmington**—Federal Works Agency, Wash., D. C., 475 dwellings for shipyards workers, to Green Lumber Co., Laurel, Miss., **$1,350,900.**

O., Huron—Bd. Educ., general contract, 2 story, brick steel school, to Juergens Co., Lakewood, **$213,575.** Bids 6/16. CD 5/26—ENR 5/29.

†Okla., Fort Sill—Con. Q.M., stables, blacksmith shops, picket lines, hay racks, water trough, etc., to Tankersley Constr. Co., Cotton Exch. Bldg., Oklahoma City. **$188,300.** Awarded 6/21. CD 6/17—ENR 6/19.

PUBLIC BLDGS. (Contracts Awarded, Cont'd.)

Pa., Rouseville—Cornplanter Twp. School Dist., J. Neidel, secy., RD 1, general contract consolidated school at Plumer, also school addn., Hasson Heights, to C. H. Ortman, Meadville***heating and ventilating, to Wm. Eckert Co., Oil City***electrical work, to Booth Elec. Co., Bradford***plumbing, to Sans Co., 59 Winsor St., Jamestown, N. Y. Total est. **$150,000.** Bids 6/24. CD 6/10—ENR 6/12.

★ **†Tennessee**—Federal Works Agency, Wash., D. C., housing, 200 homes, at Jackson, 75 at Humboldt and 25 Milan, to Algernon Blair, 1st Natl. Bank Bldg., Montgomery, Ala., **$786,625.** CD 4/25—ENR 5/1 under Milan and Humboldt.

★ **†Tenn., Milan**—War Dpt., 20 St. and Constitution Ave. N.W., Wash., D. C., design and construct additional buildings for Wolf Creek Ordnance Plant, to H. K. Ferguson Co., Hanna Bldg., Cleveland. Est. **$5,395,000.** Procter & Gamble, Gwynne Bldg., Cincinnati, O., will operate. CD 6/16—ENR 6/19.

†Tex., Mineral Wells — Con. Q.M., Camp Wolters, 1 warehouse and 10 magazine ordnance buildings, to P. O. B. Montgomery, 913 S. Akard St., Dallas, **$50,000.**

★ **†Tex., Mineral Wells**—Con. Q.M., Camp Wolters, mobilization or reception center buildings, barracks, messes, officers quarters, etc., to P. O. B. Montgomery, 913 S. Akard St., Dallas, **$532,000.** Bids 6/18. CD 6/16.

★ **†Tex., San Antonio**—Con. Q.M., Fort Sam Houston, 5 warehouses, to H. B. Kilstofte, Builders Exch. Bldg., San Antonio. **$539,900.** Bids 6/17, awarded 6/21. CD 6/18.

★ **Va., Camp Lee**—Con. Q.M., barracks, mess hall, officers quarters, etc., to Doyle & Russell, Central Natl. Bank Bldg., Richmond, **$1,400,000.** CD 6/10—ENR 6/12.

†Wyo., Fort Francis E. Warren—Con. Q.M., 7 motor repair shops and 10 classroom buildings, to J. W. Howard, Cheyenne, **$411,380.** Bids 6/19. CD 5/10—ENR 6/12.

★ **N. S., Halifax**—Wartime Housing Ltd., 55 York St., Toronto, Ont., 4 staff blocks and 225 dwellings, to Brookfield Constr. Co., Ltd., 169 Hollis St. About **$550,000.**

P. E. I., Charlottetown—Dpt. National Defense for Air, Ottawa, Ont., 7 additional buildings, Bombing and Gunnery School 6, to M. F. Schurman Co., Ltd., Water St., Summerside, P. E. I. About **$160,000.**

COMMERCIAL BUILDINGS

PROPOSED WORK

Mo., St. Louis—Unity Hall Assn., Grand and Page Blvd., soon lets contract, 2 story, bsmnt., (bsmnt. floor to be 72x105 ft.), brick, concrete 1st and 2nd floors 62x72 ft., incl. bowling alleys in basement, stores on first floor and offices on 2nd. W. J. Theodor, 2754 Accomac St., archt.

★ **N. J., Trenton**—General Housing Corp. of New Jersey, Maddock Ave., 240 residences. Over $500,000.

N. Y., Brooklyn—Hampshire Arms, Inc., 2027 E. 37 St., plans by Seelig & Finkelstein, 153 Pierrepont St., 6 story, 87x259 ft. apartment, 575 E. 19 St. $425,000.

N. Y., Brooklyn—S. Singer, 87 Livonia Ave., plans by O. I. Silverstone, 153 Pierrepont St., 6 story, 107 x 120 ft. apartment, 429 Ocean Parkway. $215,000.

N. Y., Jamestown—Montgomery Ward & Co., 619 W. Chicago St., Chicago, Ill., plans by R. R. Howe, c/o owner, 2 or 3 story, bsmnt., brick, steel, concrete retail department store, Lafayette St., $150,000.

★ **N. Y., New York**—Simon Bros., 22 E. 40 St., plans by I. Margon, 110 E. 42 St., 17 story apartment, Park Ave. and 70 St., $1,000,000.

N. Y., New York—Fidelity & Deposit Co. of Md., 99 John St., plans by J. H. and Wilson C. Ely, 744 Broad St., Newark, N. J., 6 story, 55x100 ft., limestone, red brick office, 138-140 William St. Over $150,000.

N. C., Charlotte—Claude Brown Realty Co., Liberty Life Bldg., 16 residences, Mecklenburg Heights. $150,000.

★ **Okla., Miami**—Spartan School of Aeronautics, 6900 E. Apache St., Tulsa, flying school, buildings, runways, hangars, etc. $500,000.

Pa., Freedom—Better Homes, Inc., C. H. Haney, pres., 599 8 St., Freedom, forty 1½ and 2 story residences, vicinity Curtiss Wright plant, Brighton Twp., near here. $300,000.

Pa., Phila.—P. J. Stahl, Welsh Rd., Bethayres, residences. Total est. over $150,000.

Pa., Pittsburgh — Methodist Conference, Bishop J. H. Straughn, chn., Smithfield St., brick, steel Methodist center, remodeling present church. $150,000.

Pa., Rochester—Rochester General Hospital, G. A., Baldwin, Dr. pres., Rochester, probably 4 story, bsmnt., brick on hollow tile, common brick backup hospital addn. Over $150,000.

Pa., Sharon—Bd. Trustees, C. H. Buhl Hospital, C. D. Jeffries, supt., Sharon, nurses home addn., also two 4th floor wings at hospital, $150,000.

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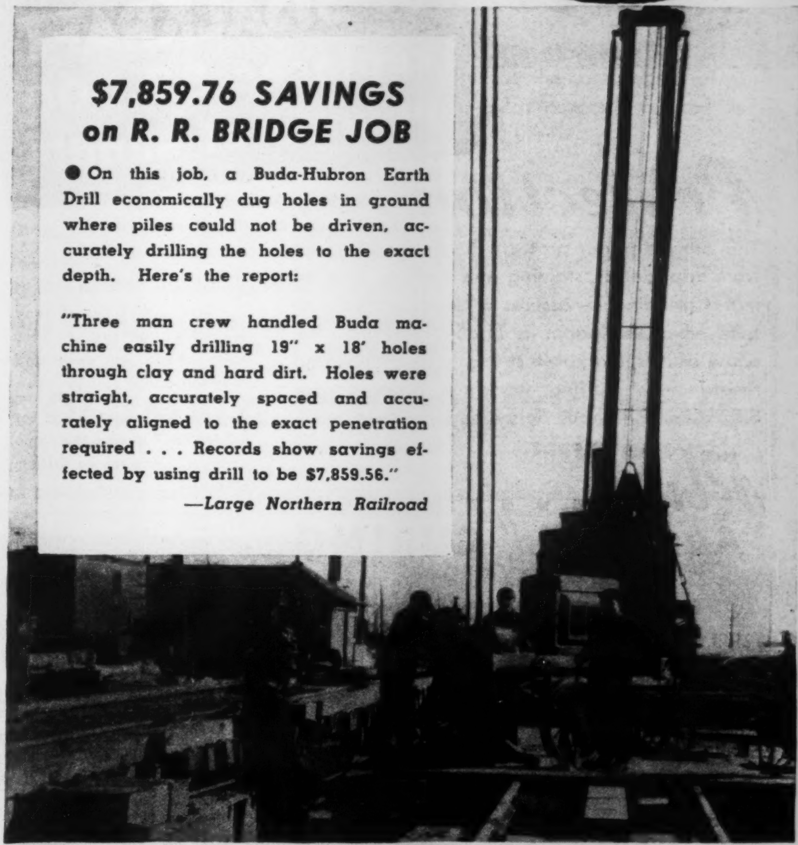

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COMMERCIAL BLDGS. (Proposed Work, Cont'd.)

Pa., Topton—Lutheran Orphanage, Topton, plans by Richter & Eiler, 147 N. 5 St., Reading, 2 story, bsmnt., brick, steel, concrete orphanage, $200,000.

Pa., Wilkinsburg—W. C. Norris, 1500 Avon Pl., completing plans 38 brick veneer and brick veneer and frame lap siding, 2 story, bsmnt., 24x30 ft. residences, Baldwin Twp., near here, $250,000.

CONTRACTS AWARDED

Conn., New Britain—D. Orr, archt., 96 Grove St., New Haven, 2 story, bsmnt., 85x120 ft., 25x30 ft., brick, steel telephone exchange, for Southern New England Telephone Co., 227 Church St., New Haven, to Fusco-Amatruda Co., 59 Amity Rd., New Haven. Est. **$150,000.** Bids 6/18. CD 6/10—ENR 6/12.

Ill., Peru—St. Bede's Abbey, Peru, general contract 3 story, 130x193 ft., brick, concrete, cut stone college addn., to T. S. Willis, Janesville, Wis.***plumbing, heating, to S. J. Reynolds Co., 2223 W. Ogden St., Chicago***electrical work, to Bulfer Electric Co., Peru. Bids 6/10. CD 6/3—ENR 6/5.

Ky., Lexington—Transylvania College, Lexington, 1 and 2 story, bsmnt., brick, stone, library, NYA labor, **$200,000.** J. T. Gillig, archt., and H. Meriwether, assoc. archt., 234 E. Short St. CD 4/3—ENR 4/17.

Md., Parkville (br. Baltimore)—R. W. Simmers, 4518 Arabia Ave., Baltimore, fifty 1½ story, 24x28 ft., brick, frame residences. Owner builds. **$200,000.**

Mo., Affton (St. Louis P. O.)—Harvey Vatterott Realty & Building Co., Lindbergh Blvd., St. Louis County, 50 bungalows, High School Lane addn. near 9300 block of Gravois Rd., St. Louis County. Owner builds. **$200,000.**

Mo., Brentwood (St. Louis P. O.)—Corporation forming, c/o Jerome Howe Realty Co., 2240 Brentwood Blvd., 1 story, bsmnt., 54x125 ft., motion picture theatre, west side Brentwood Blvd. near Madge Ave., to Stamm Constr. Co., 7351 Flora Ave., Maplewood (St. Louis P.O.).

Mo., Florissant—St. Stanislaus Seminary, c/o C. F. Zachman, rector, 3 story, attic, ground floor, 56x213 ft. brick, limestone, rein.-con. juniorate building, as seminary addn., to Walsh & Wells, Inc., 420 Security Bldg., St. Louis. L. Preuss, 34 Oak Terrace, Webster Groves, archt.

Mo., Kahoka — St. Paul's Evangelical Church, c/o G. O. Martensen, pastor, Kahoka, 1 story, bsmnt., 36x110 ft. and 24x40 ft. L-shaped brick, church and sunday school building, etc. to Hoffman Co., Kirksville Bids 6/11. CD 6/9—ENR 6/12.

Mo., St. Louis—Third Baptist Church, C. Oscar Johnson, pastor, and W. W. Martin, chn. Building Com., both 620 N. Grand Blvd., 4 story, part bsmnt., 136x156 ft., Bedford stone, brick, tile, rein.-con. educational building, 5 story, 35x35 ft. tower, to Woermann Constr. Co., 3800 W. Pine Blvd. Est. about **$450,000.** Bids 5/22. CD 5/12—ENR 5/15.

Mo., St. Louis County—D. P. Leahy, 14 N. 8 St., St. Louis, 110 one story, brick residences, Eleanor Park 2, at intersection Natural Bridge and Brown Rds. to Leahy-Johnson-Smith, Builders, Natural Bridge and Brown Rds. Est. over **$350,000.**

Neb., Omaha—Upland Homes, Inc., Omaha, 117 homes, paving, utilities, 30 and Washington Sts. Owner builds. **$440,000.** FHA. J. Latenser, 1307 Farnam St., Omaha, archt. CD 5/15—ENR 5/22.

N. J., Trenton — New Jersey Bell Telephone Co., 540 Broad St., Newark, 2 story, bsmnt., brick, steel telephone building addn., State St., to Campbell and Pentz, Inc., 15 E 40 St., New York, N. Y. Est. **$250,000.** CD 6/9—ENR 6/12.

N. Y., Farmingdale—Republic Aviation Corp., Farmingdale, administration building, to J. H. French Co., 110 E. 42 St., New York. Est. **$300,000.** Bids 6/23. CD 6/18—ENR 6/26.

N. Y., Flushing—Gross-Morton Kew Co., 160-16 Jamaica Ave., 34 two story homes, 71 Ave. and 137 St. Owner builds. **$167,500.** A. E. Allen, 90-04 161 St., Jamaica, archt.

N. Y., Jamaica—James Realty Co., 90-50 Parsons Blvd., 6 story apartment, 89-11 153 St., separate contracts. **$350,000.** M. N. Weinstein, 93 Court St., Brooklyn, archt. CD 6/23 —ENR 6/26.

N. Y., Long Island City—Citadel Hall, Inc., 1914 84 St., Brooklyn, 6 story apartment, 43-30 48 St., separate contracts. **$200,000.** Cohn Bros., 191 Joralemon St., Brooklyn, archts. CD 6/20—ENR 6/26.

N. Y., New York—Walbern Realty Corp., 2390 Tiebout Ave., 6 story 104x180 ft. apartment, Valentine Ave. and 192 St., separate contracts. **$325,000.** I. L. Crausman, 332 E. 149 St., archt. CD 6/19—ENR 6/26.

N. Y., Ozone Park—Church of Our Blessed Lady, L. Arcese, pastor, Ozone Park, church and rectory, to H. Veit, 260 Devoe St., Brooklyn. Est. **$160,000.** Bids 6/5. CD 4/19—ENR 5/22.

Pa., Allentown—H. E. Walker, Broadway Ave., dwelling development, residences, water lines, sewers, etc., Broadway Ave., separate contracts. **$150,000.** CD 5/12—ENR 5/15.

Tex., Houston—Petroleum Building, c/o M. Voss, bldg. mgr., impr., remodeling 10 story, brick, concrete building, force account. **$150,000.** H. E. Elrod, engr. and J. Bringhurst, superv. engr., both c/o Petroleum Bldg.

INDUSTRIAL BUILDINGS

PROPOSED WORK

Ark., El Dorado—PLANT—Lion Oil Refining Co., El Dorado, plant to manufacture gasoline, $400,000

Calif., Morgan Hill — PLANT — Consumers Food Products, Inc., Morgan Hill, packing and distr. plant. $40,000.

Calif., Roseville—WAREHOUSE — Southern Pacific Co., 65 Market St., San Francisco, W. H. Kirkbride, ch. engr., warehouse facilities. $60,000.

Conn., Hamden (br. New Haven)—WAREHOUSE, etc.—P. Ballantine & Sons, 975 Dixwell Ave., soon lets contract, brick, steel warehouse, garage, office. $50,000. Mylchreest & Reynolds, 238 Palm St., Hartford, engrs. CD 6/13—ENR 6/26.

Ill., Joliet—PLANT—American Steel & Wire Co., Rockefeller Bldg., Cleveland, O., coarse rod mill and mill for manufacture merchants' products, Collins St.

Ill., Skokie—POWER PLANT—Pub. Serv. Co. of Northern Illinois, 72 W. Adams St., Chicago, 43x82 ft., brick, concrete steam power plant addn. Sargent & Lundy, Inc., 140 S. Dearborn St., Chicago, engrs.

Ill., Waukegan—PLANT—American Steel & Wire Co., Rockefeller Bldg., Cleveland, O., 37x525 ft., electric galvanizing building, 60x250 ft. sulphate iron building, 60x420 ft. and 210x340 ft. rod storage facilities addns., 2 story, 39x100 ft. office building addn., etc.

★ **Ky., Louisville**—PLANT—B. F. Goodrich Co., 500 S. Main St., Akron, O., plant for processing Koroseal. Over $2,000,000.

Ky., Versailles—PLANT—Kentucky Illinois Hemp Co., C. B. Stewart, vice pres., Frankfort, 3 metal buildings, one 50x120 ft., one 40x90 ft. and other 26x60 ft. and large drying kiln and small office building. $50,000.

La., Abbeville—PLANT—Louisiana State Rice Milling Co., Abbeville, plans by Favrot & Reed, Nola Bldg., New Orleans, plant addn. $75,000.

Md., Baltimore—GARAGE—S. B. Appbley, Denrike Bldg., Wash., D. C., garage on old site Rennert Hotel, Liberty and Saratoga Sts. $175,000.

Md., Baltimore—ROUNDHOUSE—Western Maryland Ry. Co., Hillen Sta., H. R. Pratt, ch. engr., Standard Oil Bldg., 1 story, brick, steel, concrete roundhouse.

Mass., Springfield—PLANT — McClintock & Craig, engrs., Bridge St., soon lets contract, plant expansion, incl. 1 story, bsmnt., office, 1 story, heat treating plant addn., 1 story factory addn., brick, steel, for Storms Drop Forging Co., 70 Storms Court. Est. over $40,000.

Mich., Detroit—FACTORY—Vickers, Inc., 1400 Oakman Blvd., soon lets contract 1 story, 200x260 ft., brick, steel, concrete factory addn. $200,000.

Mo., Louisiana—FACTORY—Lamont, Wells, Smith Glove Corp., Louisiana, plans by T. E. Samuelson, 1791 W. Howard Ave., Chicago, Ill., 2 story, part bsmnt., 110x150 ft., steel, brick factory addn. $40,000 plus with equip.

Mo., St. Louis—PLANT—American Can Co., c/o J. M. Hall, plant supt., 41 Branch St. and 230 Park Ave., New York, N. Y., brick, steel, concrete can manufacturing plant, Oakland Ave. between Forest Park Highlands and The Arena.

Neb., Omaha—COMPRESSOR—Metropolitan Utilities Dist., 18 and Harney Sts., enlarging, rebuilding compressor building, etc. $163,000.

N. Y., Buffalo — PLANT — Three-Eighty-Three Realty Co., c/o Downtown Merchants Delivery Co., 101 Elm St., rehabilitating two 4 story, bsmnt., rein.-con. units of former Pierce-Arrow Motor Car Co. plant, Elmwood, into delivery station and warehouse. $135,000.

N. Y., Fredonia—SUPER SERVICE STATION—Sterling Oil Division Quaker State Oil Corp., Oil City, Pa., G. B. Hunter, genl. supt., Emlenton, Pa., super service station. $40,000.

N. Y., Niagara Falls—FOUNDRY, etc.—Frontier Bronze Corp., Niagara Falls, and 210 Franklin St., Buffalo, plans by W. A. Cannon, Niagara Falls, brick, steel, concrete foundry-office, and pattern storage buildings. Over $40,000.

N. Y., Ripley—SUPER SERVICE STATION—Sterling Oil Division Quaker State Oil Corp., Oil City, Pa., G. B. Hunter, genl. supt., Emlenton, Pa., super service station. $40,000.

N. Y., Westfield—SUPER SERVICE STATION—Sterling Oil Division Quaker State Oil Corp., Oil City, Pa., G. B. Hunter, genl. supt., Emlenton, Pa., super service station. $40,000.

★ **O., Avon Lake**—PLANT—Cleveland Electric Illuminating Co., W. H. Hartman, purch. agt., 75 Public Square, 4 story, brick, steel, concrete power plant addn. $3,500,000 incl. equip.

O., Cleveland—FACTORY, etc.—Curtis Lock & Key Co., M. and H. Abrams, 3219 Carnegie Ave., plans completed by James, William & Thomas, 3868 Carnegie Ave., 1 story, 50x120 ft., brick, steel factory and office building. $40,000.

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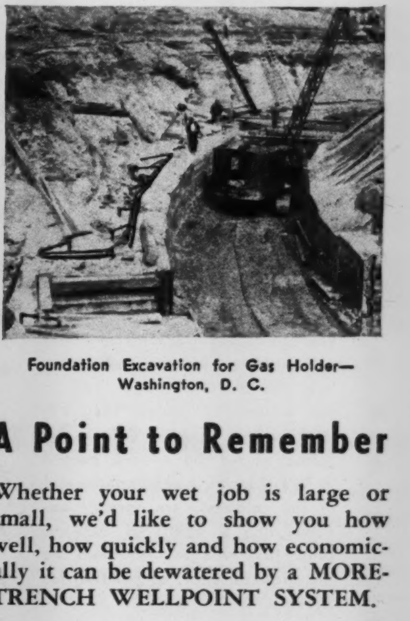

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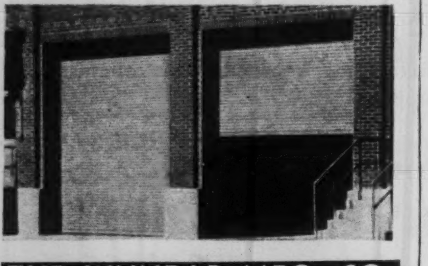

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INDUSTRIAL BLDGS. (Proposed Work, Con.)

★**O., Cleveland**—MILL—Republic Steel Corp., A. McAllister, purch. agt., Republic Bldg., 1 story, 75x700 ft., steel, glass strip mill addn. $1,000,000 incl. equip. C. A. Thayer, Republic Bldg., engr.

O., Cleveland—FACTORY—Tremco Mfg. Co., W. C. Treuhaft, pres., 383 E. 131 St., soon lets contract brick, steel factory and office building. $100,000. Bids 5/27 rejected. Christian, Schwarzenberg & Gaede Co., 1836 Euclid Ave., archt. and engr. CD 5/26—ENR 5/29.

O., Cleveland—FACTORY—Warner & Swasey Co., E. F. Kline in charge constr., 5713 Carnegie Ave., brick, glass block factory addn. $200,000. Osborn Eng. Co., 7016 Euclid Ave., engr.

Pa., Clearfield—PLANT—Clearfield Mills, H. J. Trichon, mgr., Clearfield, 1 story, brick, steel, concrete textile products plant. Over $40,000 with equip.

Pa., Corry—SUPER SERVICE STATION—Sterling Oil Division Quaker State Oil Corp., Oil City, G. B. Hunter, genl. supt., Emlenton, super service station. $40,000.

Pa., Erie — PLANT — Robeson Process Co., 1526 E. Lake Rd., 1 story, evaporator plant addn. $40,000 with equip.

Pa., North East—SUPER SERVICE STATION—Sterling Oil Division, Quaker State Oil Corp., Oil City, G. B. Hunter, genl. supt., Emlenton, super service station. $40,000.

R. I., Providence—PLANT—Standard Mchy. Co., 1475 Elmwood Ave., soon lets contract, 1 story, 80x120 ft., brick, steel, plant, Elmwood Ave. $40,000. Jenks & Ballou, 2600 Industrial Trust Bldg., engrs.

Pa., Albion—PLANT—Rogers Bros. Corp., Albion, 1 story, brick, steel, concrete plant addn. $50,000 or more.

Pa., Bellefonte—FACTORY—Titan Metal Co., Bellefonte, factory. $200,000.

Pa., Erie—PLANT—American Boiler Wks., foot of State St., plant unit, foot of Plum and Cascade Sts. Over $50,000.

Pa., Wilkes-Barre—WAREHOUSE—T. C. Thomas, 155 S. Penna Ave., 1 story, bsmnt., 80x120 ft., brick, steel, concrete warehouse and distr. center, Union St. and N. Penna Ave. $75,000.

Pa., York—WAREHOUSE—York Motor Express Co., York, warehouse and motor truck terminal, Frankford Ave. $40,000.

★**Tex., San Diego**—RECYCLING PLANT—Trinity Gas Corp., c/o Magnolia Bldg., Dallas, recycling plant, Sejita fields, area. $800,000.

Wash., Seattle—FORGE PLANT—Isaacson Iron Wks., 2917 E. Marginal Way, expansion heavy forging facilities. $250,000.

★**Wash., Seattle** — FURNACE — Bethlehem Steel Co., E. 3 St., Bethlehem, Pa., open hearth furnace, reheating furnace, at structural mill and exten. storage and shipping facilities at local plant. $1,100,000.

★**Wash., Seattle**—FOUNDRY—Pacific Car & Fdry. Co., 220 W. Hudson St., foundry. $650,000.

★**B. C., Alberni** — MILL — Alberni-Pacific Lumber Co. Ltd., Alberni, bids soon, plywood mill. $500,000 equipped.

Ont., Grimsby—FACTORY—Horrocks Ibbotson Co. of Canada, Grimsby, rebuilding factory. $50,000 fire loss.

★**Ont., Malton**—PLANT—National Steel Car Corp., Ltd., Kenilworth Ave. N., Hamilton, bids soon, aircraft plant. Est. about $2,500,000. N. Wagner, c/o owner, ch. engr.

Ont., Welland — CHANGE HOUSE — Atlas Steels Ltd., Main St., plans by F. W. Warren, 7 Hughson St., Hamilton, 2 story, 60x60 ft., hollow tile change house. $45,000.

BIDS ASKED

Bids Asked July 8

N. J., Caldwell—OIL HOUSE—Wright Aeronautical Corp., Fairfield Rd., 1 story, brick, rein.-con. chip disposal and oil house Fairfield Rd. Albert Kahn & Assoc., 345 New Center Bldg., Detroit, Mich., archt.

CONTRACTS AWARDED

Ark., Texarkana — PLANT — W. S. Dickey Clay Mfg. Co., New York Life Bldg., Kansas City, Mo., rebuilding clay products plant, dryer building, machine shop, press room, etc., to Winn-Senter Constr. Co., Railway Exch. Bldg., Kansas City, Mo. **$125,000** to **$150,000.** Bids 6/12, awarded 6/16. CD 6/9.

Ill., Moline—FACTORY—Deere & Co., 1325 3 Ave., general contract 2 story, 110x220 ft. factory, to J. H. Hunzinger & Co., Davenport, Ia. Total est. **$131,000.** CD 5/26—ENR 5/29.

Ia., Waterloo—PLANT—Iowa Pub. Serv. Co., Waterloo, power plant imprvs., steam boiler installation, to Edge Moore Iron Wks., Edge Moore, Del., **$75,375.** CD 2/17—ENR 2/20.

★**Kan., Wichita**—FACTORY—Stearman Aircraft Corp., Div. Boeing Airplane Co., RFD 5, Wichita, 200x1000 ft. and 100x100 ft. airplane factory addn., to Austin Co., 16112 Euclid Ave., Cleveland, O. Est. over **$1,000,000.** CD 6/11—ENR 6/19.

Md., Baltimore—CLOCKHOUSE, etc.—Bethlehem Fairfield Shipyard, 1900 Frankhurst Ave., clockhouse, hospital, to Booth and Flynn, Inc., 1942 Forbes St., Pittsburgh, Pa.

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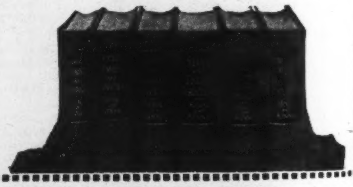

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NR 7-3-41

INDUSTRIAL BLDGS. (Contracts Awarded, Cont'd.)

Md., Baltimore—WIRE MILL—Rustless Iron & Steel Corp., 1101 Edison Hy., 1 story, 60x440 ft., brick, steel wire m'. addn., concrete fdn., to Cummins Constr. Corp., 803 Cathedral St. Est. **$100,000.**

Mich., Monroe — PLANT — La-Z-Boy Chair Co., Monroe, E. M. Knabusch, pres. and genl. mgr., plant, to Rutledge & Gratton, Monroe. **$50,000.** CD 5/26—ENR 5/29.

Mo., Hannibal—FACTORY—C. L. Downey Co., 943 Clark St., Cincinnati, O., brick, concrete factory, to John Martin Constr. Co., Hannibal. **Est. $41,000.**

Mo., North Kansas City—WAREHOUSE—North Kansas City Development Co., 14 and Clay Sts., 1 story, 117x300 ft. warehouse and office, to Hiram Elliot Constr. Co., Armour and Jasper Sts. Over **$40,000.** Keene & Simpson, Land Bank Bldg., Kansas City, archt. and engrs. B. F. Goodrich Rubber Co., 3330 Main St., Kansas City, lessee.

Mo., St. Louis—PLANT—Carlova Inc., 426 Adelaide Ave., 1 story, 131x220 ft. and 62x80 ft., monitor-type cosmetic manufacturing plant addn., 426 Adelaide Ave., to Atlas Constr. Co., 1438 N. 9 St. Est. **$75,000.** Atlas Constr. Co., 1438 N. 9 St., archts.

Mo., St. Louis—SHOP, etc.—Leaco, Inc., 4217 N. Grand Blvd., 1 story, 80x140 ft., brick shop and factory, concrete fdn., 4286-90 Natural Bridge Ave., to H. Kissel's Sons, 4107 W. Florissant Blvd. Est. **$40,000** with equip.

Mo., St. Louis — WAREHOUSE — Grand Leader Realty Co., c/o Stix, Baer & Fuller Co., 601 Washington Ave., superstructure, 3 story, bsmnt., 63x182 ft., brick, concrete warehouse addn., altering 2 story and 6 story, relay depot for department store, 3720 Laclede Ave., to Gamble Constr. Co., 620 Chestnut St. Total est. **$200,000.** Bids 6/17. CD 6/17—ENR 6/19.

Mont., Billings—GARAGE—Northern Pacific R. R. Co., 176 E. 5 St., St. Paul, Minn., B. Blum, ch. engr., 80x120 ft. garage and 40x60 ft. addn., to H. Halverson Constr. Co., 3225 1 Ave. S. Est. **$75,000.**

N. J., Avenel—FACTORY—National Varnished Products Co., 23 Main St., Woodbridge, 1 and 2 story, 60x100 ft., concrete block factory, 25x40 ft. concrete block varnish house, steel stack, Blazing Star Rd., to William McGill, Valley Rd., Sterling. **$40,000.** G. Hayes, 280 Genterbury Rd., Westfield, engr.

N. Y., Brooklyn—SHIPPING SHED, etc.—Bush Terminal Co., 100 Broad St., New York, altering 1 and 6 story shipping shed, and receiving platform, 51 St. near 1 Ave., to Higginson-Johnstone Co., E. 48 St., New York. Est. **$40,000.** CD 6/19—ENR 6/26.

N. Y., New York—STORAGE, etc.—Decatur 195 St. Corp., 250 W. 57 St., 3 story, 75x100 ft., storage and stores, Bway. near Spuyten Duyvil Parkway, separate contracts. **$40,000.** J. M. Felson, 250 W. 57 St., archt. CD 6/23—ENR 6/26.

O., Cincinnati — FACTORY, etc. — Magnus Metals Div. National Lead Co., 659 Freeman Ave., general contract 2 story, brick, rein.-con., steel factory and office building, to Campbell, Lowrie & Lautermilch Corp., 400 W. Madison St., Chicago, Ill. Est. **$250,000.** Olsen & Urbain, 8 E. Huron St., Chicago, Ill., archts.

O., Cleveland — PLANT — Republic Steel Corp., A. McAllister purch. dpt., Republic Bldg., plate shearing and shipping plant, 800 Denison Ave. **$40,000.** Owner builds. L. Larson, 3100 E. 45 St., ch. engr.

O., Cleveland—FACTORY—Foundry Equipment Co., C. A. Barnet, pres., 1831 Columbus Rd., 1 story, 50x116 ft. brick, steel factory addn., to Peck & Udell Constr. Co., 4500 Euclid Ave. Est. **$40,000.** Awarded 6/23. F. Haushka, Chester-Ninth Bldg., engr.

O., Euclid — FACTORY — E. W. Bliss Co., 22501 St. Clair Ave., 1 story, 100x122 ft., brick, steel factory addn., to Austin Co., 16112 Euclid Ave., Cleveland. Est. **$50,000.**

O., Toledo—PLANT—Spicer Mfg. Co., R. E. Carpenter, vice pres., 4100 Bennett Rd., 1 story, 165x200 ft. factory addn., 3 story 100x165 ft. office building, to A. Bentley & Sons Co., 201 Belmont Ave. Est. **$240,000.** CD 3/13—ENR 3/20.

Tex., Dallas—WAREHOUSE—Morten Milling Co., 916 Cadiz St., metal type construction warehouse, concrete fdn., force account. **$12,000.** Lockwood & Andrews, Union Natl. Bldg., Houston, engrs.

Tex., Pasadena — PLATE SHOP — Houston Shipbuilding Corp., c/o Electric Bldg., Houston, 1 story, 27x250 ft. plate shop, steel frame, rein.-con. and fdn., below Houston on Ship Channel, to Brown & Root, 4300 Calhoun Rd., Houston. **$95,000.**

Tex., San Antonio—WAREHOUSE, etc.—Austin Hi-Way Lumber Co., c/o H. Steinbomer, archt., 120 King Wm. St., warehouse and lumber storage sheds, Austin Hy., to A. Mathis, Jr., 6323 Bway., **$42,600.** Bids 6/21, awarded 6/22. CD 6/20.

Wash., Seattle—GARAGE — Great Northern Ry. Co., 175 E. 4 St., C. M. Nye, ch. engr., St. Paul, Minn., altering, constructing garage addn., 1021½ 4 Ave. S., to Atherton Constr. Co., Terminal Sales Bldg. Est. **$40,000.**

W. Va., Wayne—WINERY—Garrett & Co., Wayne, winery, to R. H. Hamill & Co., Huntington. Est. **$40,000** with equip.

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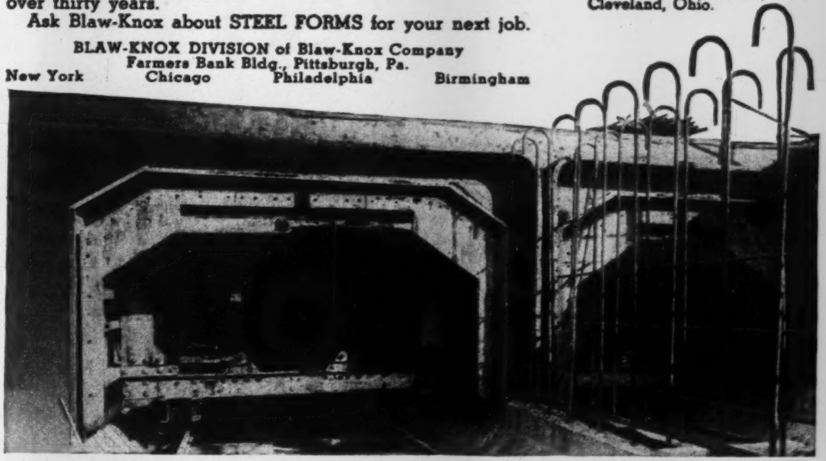

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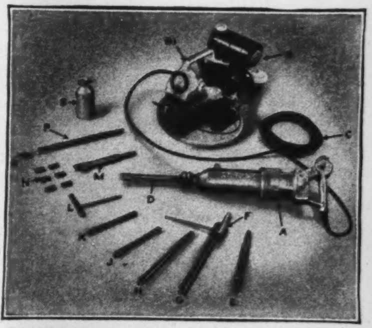

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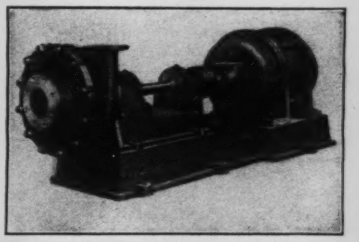

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***COPY RECEIVED** UP TO 12 NOON TUESDAY FOR ISSUE OUT THURSDAY SUBJECT TO SPACE OPEN FOR LAST-MINUTE ADS*
***SEND COPY** TO OFFICIAL PROPOSAL DIVISION, ENGINEERING NEWS-RECORD, 330 W. 42ND ST., NEW YORK, N. Y.*

Bids: July 16 (387)

State Highway Work

STATE DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS
ALBANY, N. Y.

Sealed proposals will be received by the undersigned at the State Office Building, 13th Floor, Albany, N. Y., until one o'clock p. m., advanced standard time, which is twelve o'clock noon, eastern standard time, on WEDNESDAY, JULY 16, 1941, for the following highway and bridge projects:

County	Deposit for plans	Bid deposit	Type	Miles
			RECONSTRUCTION	
Chautauqua	$5	$3,500	42.5' to 80' MMO. 40.5' to 42.5' Concrete 9"	0.71
Delaware	5	13,500	Concrete	2.97
Erie — Niagara	5	3,000	Painting Bridges	....
Essex	5	3,000	32' I-Beam; Concrete Approach	0.42
Jefferson	5	7,000	Concrete	2.13
			CONSTRUCTION & RECONSTRUCTION	
Oneida	10	21,500	46' Div. Lane Concrete Misc. Work	2.67
Oswego	10	32,000	Concrete	7.03

Maps, plans, specifications, and estimates may be obtained at the office of the Division of Highways, Albany, N. Y., and at the office of the District Engineers in whose districts the roads are located. The names and addresses of the District Engineers and counties in their districts will be furnished upon request, and may be seen at the office of the State Department of Public Works, State Office Building, Worth and Center Streets, New York City.

The deposit for Plans and Proposal Forms for each contract containing 1 to 15 sheets is $5.00; 16 to 30 sheets, $10.00; over 30 sheets, $20.00. A refund will be made in full to bidders for return of one set, in good condition, within 30 days of award, or rejection of bids; refund for all other sets in good condition, similar period, will be 50% of deposit.

Special attention of bidders is called to "General Information for Bidders" in the proposal, specifications, and contract agreement, and to the special provisions applying to projects financed with federal funds.

Proposal for each contract must be submitted in a separate sealed enveloped with the name and number of the contract plainly endorsed on the outside of the envelope. Each proposal must be accompanied by cash, draft or certified check payable to the order of "State of New York, Division of the Treasury," for the sum as specified in the advertisement and the proposal. The retention and disposal of the bidding check, the execution of the contract and bonds shall conform to the provisions of the Highway Law, as set forth in "Instructions to Bidders."

When optional types are permitted on contracts with federal funds, bidders must state in the space provided in the proposal the exact designation of the optional type upon which the proposal is predicated.

Minimum Wage Rate per hour for above work shall be as follows:

County	Skilled Labor	Intermediate Grade Labor	Unskilled Labor
Chautauqua	.75	.65	.65
Delaware	.75	.55	.45
Erie	.75	.75	.75
Essex	.75	.55	.50
Jefferson	.75	.55	.55
Niagara	.75	.75	.75
Oneida	.75	.60	.60
Oswego	.75	.60	.60

UNLESS SHOWN OTHERWISE IN THE ITEMIZED PROPOSAL FOR EACH PROJECT.

The right is reserved to reject any or all bids.

A. W. BRANDT,
Supt. of Public Works.

Bids: July 15 (294)

Bridge

SOUTH CAROLINA PUBLIC SERVICE AUTHORITY
SANTEE-COOPER PROJECT
DOCKET NO. 4329-P-R
ATLANTIC COAST LINE RAILROAD BRIDGE

1. TIME AND PLACE OF OPENING BIDS: Sealed proposals for constructing the Atlantic Coast Line Railroad Bridge and interlocking equipment will be received by the South Carolina Public Service Authority at the office of the Engineer, Harza Engineering Company, 27 Cumberland Street, Charleston, S. C., until 10:00 a.m., July 15, 1941, at which time all proposals will be taken to the Fort Sumter Hotel where they will be publicly opened and read.

2. PROCUREMENT OF PLANS AND SPECIFICATIONS: Proposals must be submitted on the forms furnished by the Authority. These forms, including the plans and specifications and other contract documents, may be obtained from the office of the Secretary of the Authority, Room 508, Peoples Office Building, Charleston, S. C., upon payment of $10.00 for the first set and $3.00 per set thereafter. NO REFUND WILL BE MADE. These documents may also be examined free of charge at the offices of the Authority, Columbia and Charleston, S. C.; at the offices of the Engineer, 27 Cumberland Street, Charleston, S. C., and 205 W. Wacker Drive, Chicago, Illinois; at the offices of Keller & Harrington, 205 W. Wacker Drive, Chicago, Illinois, at the offices of the Associated General Contractors, Columbia, S. C., Charlotte, N. C., Raleigh, N. C., Atlanta, Ga.; and at the plan room of the F. W. Dodge Company, Atlanta, Ga.

3. DESCRIPTION OF THE WORK: The site of the bridge is about 2 miles north of Moncks Corner, S. C., on the main line of the Atlantic Coastline Railroad where it crosses the Tail Canal of the South Carolina Public Service Authority. A hard surfaced road crosses the railroad about ½ mile north of the site and connects to U. S. Highway No. 52. The concrete supporting piers are being constructed under another contract. The work under this contract will be done in two schedules. One schedule will include furnishing and erecting the structural steel superstructure and machinery. The other schedule will include furnishing and erecting the interlocking and signal equipment. The bridge consists of a 164 foot vertical lift span, two 119 foot flanking spans, two new and two old deck plate girder spans. The work is a part of the Santee Cooper Hydroelectric and Navigation Project of the South Carolina Public Service Authority.

The principal quantities involved are as follows:

Structural Steel	1400 Tons
Machinery	100 Tons

Lists of prospective bidders and interested parties will be supplied to any manufacturer or person desiring to sub-contract for a part of the work upon application to the Secretary of the Authority.

4. BIDDER'S BOND: Each bid must be accompanied by a certified check or bidder's bond executed by the bidder and a surety company licensed to do business in South Carolina and Countersigned for the Surety by an agent or attorney-in-fact who is a bona fide resident of the State of South Carolina, in the sum of not less than five percent of the amount of the bid. This is required as a guarantee that if the bid is accepted, a contract will be immediately entered into and the performance of it properly secured. The certified check or bond will be returned upon non-acceptance of bid or execution of contract.

5. WITHDRAWAL AND REJECTION OF BIDS: No bid may be withdrawn for a period of thirty days after the date set for the opening of said bid. The Authority reserves the right to reject any or all bids and to waive informalities therein.

6. LICENSES: An Act of the General Assembly of South Carolina approved June 2, 1936, entitled "An Act to Regulate the Practice of General Contracting in South Carolina" provides that general contractors (defined as anyone who, for a fixed price, commission, fee or wage, undertakes to construct or superintend the construction of any building, highway, sewer, grading or any improvement or structure where the cost of the undertaking is seven thousand five hundred dollars ($7,500.00) or more) shall file a written application for general contractor's license with the South Carolina Licensing Board for Contractors, Columbia, S. C., said application to be filed thirty days prior to any regular or special meeting of said Board and to be accompanied by $20.00.

Bidders must satisfy the requirements of the South Carolina State Statutes regarding annual license tax and license tax on each individual contract, as set forth in Section 2543 of the Civil Code of 1932. Bidder's licenses may be obtained from the South Carolina Tax Commission, Columbia, S. C., price $100.00.

Each bidder will be required to show evidence of the issuance of such general contractor's and bidder's licenses before his bid is opened or considered.

7. VIEWING SITE: Prospective bidders will be given assistance in viewing the site of the work upon application to the offices of the Harza Engineering Company, 27 Cumberland Street, Charleston, S. C., or Pinopolis dam site near Moncks Corner, S. C.

By order of the Board of Directors.
SOUTH CAROLINA PUBLIC SERVICE AUTHORITY,
By TOM B. PEARCE,
Chairman.

ATTEST:
CHARLES H. GERALD,
Secretary

Bids: July 24 (395)

Waterworks Improvements

Sealed bids will be received by the City Council of the City of Vero Beach, Florida, at the City Hall until 8:00 P. M., E. S. T., July 24, 1941, at which time they will be publicly opened and read, for furnishing material and labor for the installation of a shallow 8-inch well complete with screen, turbine pump, motor, pipe and fittings; remodeling present softeners and filter plant; fencing plant; erection of a new 250,000 gal. elevated tank with piping, valves and meters, moving present 75,000 gallon tank; installation of 6,500 ft. of 8-inch C. I. mains, 6,200 ft. of 6-inch C. I. mains, 34 hydrants, and 12 valves.

Plans, specifications, contract and bond forms may be examined at the City Hall, or sets may be obtained from the Supt. of Public Works by payment of $10.00. Any bidder, upon returning such set promptly in good condition will be refunded his payment, and any non-bidder will be refunded $5.00.

All bids must be upon the blank forms provided by the City. Each bid must be accompanied by a certified check or bid bond in the amount of five (5) per cent. of the bid as a guarantee that the bidder if awarded the contract, will within 10 days after being given written notice of such award, enter into a written contract with the City of Vero Beach, Florida, in accordance with the accepted bid and give a Contract Surety Bond satisfactory to the City of Vero Beach equal to 100% of the contract price.

Award of the contracts is contingent upon receipt of funds from the sale of $85,000 worth of revenue certificates.

Bidder's qualifications must be satisfactory to the City Council of the City of Vero Beach, Florida, and the City Council reserves the right to waive informalities in any bid and to reject any and all bids. Additional information on application.

HARRY W. DAMEROW,
Supt. Public Works.

Read